Release in Full

[redacted]

MURPHY CORPORATION

EAST POPLAR UNIT WELL NO. 22

SW/4 SW/4 Section 14, Township 28N, Range 51E
Roosevelt County, Montana

Elevation 2190' KB.

MURPHY CORPORATION

EAST POPLAR UNIT WELL NO. 22

LOCATION: 660' from the West Line, and 560' from the South Line, SW/4 SW/4 Section 14, Township 28N, Range 51E, Roosevelt County, Montana.

ELEVATION: 2177' Ground; 2190' KB.

SPUDDED: March 20, 1953.

COMPLETED: April 27, 1953.

TOTAL DEPTH: 5937' Driller; 5940' Lane-Wells; 5942' Schlumberger; 5940' Casing Measurements: PBTD 5930' Driller equals 5930' Lane-Wells.

March 20: Spudded at 3:30 A.M., and drilled a 12 3/4" surface hole to 965 feet.

March 21: Drilled 12 3/4" hole from 965' to 1029'; ran Schlumberger E.S. Set 1004.03' of 9 5/8", 36#, J-55, 8 rd. thd. R-2 & 3 American casing. Landed 13.00' below RKB; cemented with 400 sacks of Ideal regular bulk cement, 15.50# slurry, clean cement back to surface. Plug down at 7:15 P.M. Released pressure; would not hold. Shut-in 800# on pipe.

March 22: Waiting on cement.

March 23: Drilled cement out from under 9 5/8" casing. Drilled 8 3/4" hole from 1031 to 1276 feet.

March 24: Drilled from 1276 to 2435 feet.

March 25: Drilled from 2435 to 2975 feet; depth correction: 2975' equals 2982 SLM.

March 26: Cut and pulled Core No. 1, from 2982 to 2994, recovered 12 feet. Started cutting Core No. 2 at 2994 feet.

March 27: Finished cutting and pulled Core No. 2 from 2994-3020, recovered 18 feet. Cut and pulled Core No. 3 from 3020-3025, recovered 13½ feet. Ran Drill Stem Test No. 1 from 3014-3025.

March 28: Reamed 7 7/8" rat hole and drilled from 3025 to 3372 feet.

March 29-April 5: Drilled from 3372 to 4930 feet.

April 5: Started cutting Core No. 4 at 4930 feet.

HISTORY

April 6: Finished cutting and pulled Core No. 4 from 4930-4960, recovered 30 feet. Started cutting Core No. 5 at 4960 feet.

April 7: Finished cutting and pulled Core No. 5 from 4960-4990, recovered 20 feet. Reamed core hole and drilled from 4990-5006. Circulated samples and started cutting core No. 6 at 5006 feet.

April 8: Finished cutting and pulled Core No. 6 from 5006-5021, recovered 13½ feet. Reamed core hole. Ran Drill Stem Test No. 2 from 5004-5008½. Drilled from 5021 to 5034 feet.

April 9-14: Drilled from 5034 to 5550 feet.

April 14: Cut and pulled Core No. 7 from 5550-5573, recovered 23 feet. Started cutting Core No. 8 at 5573 feet.

April 15: Finished cutting and pulled Core No. 8 from 5573-5603, recovered 29 feet. Ran Drill Stem Test No. 3 from 5592-5603'.

April 16: Drilled from 5603 to 5715 feet.

April 17: Cut and pulled Core No. 9 from 5715-5750, recovered 35 feet. Drilled from 5750 to 5786 feet.

April 18: Drilled from 5786 to 5850 feet. Started cutting Core No. 10 at 5850 feet.

April 19: Finished cutting and pulled Core No. 10 from 5850-5901, recovered 51 feet. Ran Schlumberger E.S. and Microlog. Schlumberger total depth: 5911 feet.

April 20: Cut and pulled Core No. 11, 5901-5911, recovered 8 feet. Strapped pipe out of hole: depth correction: 5911 equals 5916' SLM. Ran Drill Stem Test No. 4 from 5901-5916'.

April 21: Cut and pulled Core No. 12 from 5916 to 5926, recovered 11 feet. Cut and pulled Core No. 13 from 5926-5937', recovered 12 feet.

April 22: Set 5929.30' (192 joints) of 5½", 15.50#, J-55, 8 rd. thd. German and American casing; landed 11.70' below RKB; cemented with 250 sacks of Pozmix and Ideal cement with 2% gel. Bumped plug with 1000#; pressure held okay. Plug down at 9:30 P.M. Pipe rotated freely throughout job.

April 23-25: Waiting on cement.

April 25: Drilled plug and float collar to 5930'; drilled cement from 5876 to 5903 feet. Ran Lane-Wells Gamma Ray-Neutron Log. Perforated interval from 5908 to 5918 with 4 jet shots per foot.

April 25-27: Well undergoing completion, as set forth under Completion Data. Rig released at 12:00 noon, 4-27-53.

Acidized "D" Zone from 5908-5916 with 1000 gallons of regular acid; broke formation at 2900#. Displaced 5 barrels per minute at 2300#. Displaced acid with oil. Overflushed 225 gallons of oil, final pressure was 1300#. Flowed new clean oil to surface in 25 minutes. Cleaned to pits for 80 minutes (did not get any free acid back). CSIP: 925# TSIP: 950#. Turned into tanks at 11:30 A.M., 4-27-53. Released rig at 12:00 o'clock noon, 4-27-53. PBTD: 5930' Driller equals 5930' Lane-Wells.

16—43094-1 U. S. GOVERNMENT PRINTING OFFICE

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

Spudded in at 3:30 A.M., 3-20-53. Drilled to 1031' and then ran 24 joints, (1004.03') 9 5/8" casing; landed 13.00' below RKB. Cemented with 400 sacks of Ideal regular bulk cement, 15.5#/gallon slurry. Bumped plug with 1100#. Released pressure; would not hold. Shut-in with 800# on pipe. Plug down at 7:15 P.M., 3-21-53. Clean cement back to surface. Drilled to 2975'. Depth correction: 2975' equals 2982' SLM. Cut Core No. 1 from 2982-2994, recovered 12'. Cut Core No. 2 from 2994-3020, recovered 18'. Cut and pulled Core No. 3 from 3020-3025, recovered 13½'. Ran D.S.T. No. 1, 3014-3025, with HOWCO formation packer set at 3011'. Tool open at 6:41 P.M. Open for 30 minutes with strong blow of air throughout test. Closed tool at 7:21 P.M. Shut in for 15 minutes. Recovered: 925' fresh water with no shows of oil or gas. Chlordies: 660 ppm. IBHFP: 65# FBHFP: 425# SIBHP: 1140# Hydro: 1610#. Drilled to 4930'. Cut and pulled Core No. 4 from 4930-4960, recovered 30'. Cut and pulled Core No. 5 from 4960-4990, recovered 20'. Drilled from 4990 to 5006, then cut and pulled Core No. 6 from 5006-5021 (Heath), recovered 13½'. Reamed rat hole and ran D.S.T. No. 2 from 5004 to 5008.50', with Johnston tool and straddle packers, 1/2" bottom choke, no water cushion. Tool open at 1:25 P.M., 4-8-53, for 1 hour. No shut-in (not enough space between packers for pressure bomb); tool open with strong blow which decreased to weak blow at end of test. Recovered: 1860' clear salt water with trace of oil in top stand only. Bottom packer failed to effect a complete shut-off; pressure bomb showed gradual decrease in pressure. Drilled to 5550, then cut Core No. 7 from 5550-5573, recovered 23'. Cut and pulled Core No. 8 from 5573-5603, recovered 29' (top of the "A" Zone at 5596'). Ran D.S.T. No. 3, 5592-5603, with Johnston Tool, 1/2" Bottom choke, no W.C. Tool open at 5:46 P.M., 4-15-53 for 168 minutes, closed 20 minutes. Tool open with good blow, increased to strong blow in 10 minutes. Gas to surface in 159 minutes; salt water to surface, with slight trace of oil in 168 minutes; bottom 90' black sulphur water cut mud. IBHFP: 225# FBHFP: 2775# BHSIP: 2950# Hydro: 3275#. Drilled from 5603-5715', then cored No. 9 from 5715 to 5750, recovered 35'. Drilled from 5750 to 5850, then cut and pulled Core No. 10, from 5850-5901, recovered 51'. Cut and pulled Core No. 11 from 5901-5911, recovered 8'. Strapped pipe out of hole and had the following depth correction 5911' equals 5916' SLM. Ran D.S.T. No. 4, 5901-5916, with Halliburton Tool, 5/8" bottom choke, no water cushion; tool open at 2:32 P.M., 4-20-53, for 135 minutes; closed tool for 20 minutes. Tool open with good blow increased to strong blow in 10 minutes. Recovered: 2433' total fluid; 1147' clean oil, 1286' oil and gas cut mud with free oil. Note: Bottom 248' had more free oil than gas cut mud; no show of water. IBHFP: 60# FBHFP: 930# BHSIP: 988# Hydro: 3380#. Cut and pulled Core No. 12 from 5916-5926, recovered 11'. Cut and pulled Core No. 13 from 5926-5937, recovered 12'. Total depth: 5937 feet. Ran 192 joints (5929.30') 5½" casing, landed 11.70' below RKB, cemented with 250 sacks of Pozmix and Ideal cement mix with 2% gel. Bumped plug with 1200#; released pressure, held okay. Plug down at 9:30 P.M., 4-22-53. Pipe rotated freely throughout job.

(Continued on top of page)

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

(Continued)

Tested 5½" casing with 1000# for 30 minutes; held okay. Top of cement at 5879'; float collar at 5906'. Drilled to 5930' Total depth, driller. Ran Lane-Wells Gamma Ray-Neutron and collar log. Total depth Lane-Wells 5930'. Perforated interval, 5908-5918, with 4 jet shots per foot. (Lane-wells measurement) Ran 190 joints (5885.78') of 2 3/8" EUE tubing, with 3.78' perforated nipple bull plugged on bottom; landed 10.20' below RKB. Bottom of tubing at 5899.78'. Displaced mud with water, water with oil; well would not flow. Swabbed displacement oil down to 3000'. Swabbed 130 barrels of oil into test tank, (54 barrels displaced oil, 76 barrels from formation), fluid level while swabbing remained at 3000'; swabbed only clean oil. Acidized "O" Zone from 5908-5918 with 1000 gallons of regular acid; broke formation at 2900#. Displaced 5 barrels per minute at 2300#. Displaced acid with oil. Overflushed 225 gallons of oil, final pressure was 1300#. Flowed new clean oil to surface in 25 minutes. Cleaned to pits for 80 minutes (did not get any free acid back). CSIP: 925# TSIP: 950#. Turned into tanks at 11:30 A.M., 4-27-53. Released rig at 12:00 o'clock noon, 4-27-53. PBTD: 5930' Driller equals 5930' Lane-Wells.

EAST POPLAR UNIT NO. 22
SUPPLEMENT TO WELL HISTORY

9-14-99	Kill tubing with heavy treated water. Move in and rig up pulling unit. Wellhead had a solid pack off in it. Couldn't lower tubing to release packer. Shut down. Order BOP
9-15-99	Get doughnut out of wellhead. Put on BOP. Tried to release packer, couldn't. Call wire line, cut tubing off at 5850'. 7' 2-3/8" tubing above packer. Casing pressured up. Shut down
9-16-99	Kill casing with heavy treated water. Laid down tubing. Set Cast Iron Bridge Plug at 5835'. Dump 4 sacks cement on top of plug.
10-6-99	Run M.I.T.. Pressure casing to 300#, held for 30 minutes. Test witnessed by Irene Harris with the BLM.

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

East Poplar Unit H Battery and Wells EPU Nos. 22, 32, 55, 101, & 104

The East Poplar Unit H Battery and the wells producing into the battery, EPU 22, 32, 55, 101, & 104, are onshore production facilities located in Roosevelt County, Montana, in the East Poplar Unit Oil Field. The battery consists of a 8' x 27' vertical separator, a circulating pump with appropriate lines, and two 300 barrel welded steel tanks. An earthen pit of about 8,000 barrel capacity is located at the tank battery into which the separator or tanks may be emptied if needed for fluid storage.

The field is about 6 miles Northeast of Poplar, Montana, in Townships 28 and 29 North and Ranges 50 and 51 East.

The operator of the East Poplar Unit H Lease is Murphy Oil Corporation located at P.O. Box 547, Poplar, Montana 59255. The corporation headquarters are at 200 Jefferson Avenue, El Dorado, Arkansas 71730.

The foreman, Mr. Gerald Hagadone, is responsible for oil spill prevention at this facility. On each trip to the lease the pumper makes a visual inspection of all facilities and reports any malfunction to the foreman, Mr. Gerald Hagadone, and notes this malfunction on the ten day gauge report. There has been no reportable oil Spill Event during the twelve months prior to January 10, 1974.

The equipment is in excellent operating condition and there is no reasonable likelihood of a discharge or spill event.

The field flow lines and well casing of each well are cathodically protected.

Personnel are properly instructed in the operation and maintenance of equipment to prevent oil discharges, and applicable pollution control laws, rules and regulations. Each employee is given these instructions by the field foreman when they are employed. Scheduled prevention briefings for the operating personnel are conducted frequently enough to assure adequate understanding of the SPCC Plan. The procedures are reviewed every six months by the field foreman with each employee. When changes occur in procedures, each employee is informed.

Fluid in the 8,000 barrel storage pit is pumped to the salt water disposal unit if the water is brackish as determined by chloride tests. If only fresh water is contained in the pit it is disposed of by placing on lease roads to control dust and compact the roads. Any oil in the pit is pumped back through the separator with the water being sent to the disposal well. Oil skims are burned by state permits. There are no outlets from the storage pit and all fluids must be pumped out.

The two 300 barrel tanks are steel and are welded construction. The tanks are vented to the atmosphere and have unrestricted 4" overflow lines between tanks.

All five wells flow and do not need well cellars or overflow pits.

The facilities are about 3.0 miles from the Poplar River. The terrain dips gently West. The soil is sandy and the fields are under cultivation. Because of the distance to the river, the type of soil, and the terrain the 8,000 barrel pit at the tank battery is sufficient secondary containment for these facilities.

The tanks are observed daily by the pumper. Periodically, the foreman checks the entire tank battery and producing wells closely. If any trouble is suspected, the facility is shut down, the tanks and/or separator are emptied and cleaned. The facility is then thoroughly inspected by service company personnel, repairs are made if needed and the unit is placed back into service.

Produced salt water is pumped to a field gathering system for injection into a salt water disposal well. The above ground facilities are observed daily by the pumper and inspected by the foreman closely on his visits to the lease.

All salt water disposal flowlines are cement asbestos lines. These lines are buried and the surface is observed daily by the pumper.

MANAGEMENT APPROVAL

This SPCC Plan will be implemented as herein described.

Signature _____

Name _____

Title _____

CERTIFICATION

I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

_____
Printed Name Of Registered Professional Engineer

(Seal)

_____
Signature Of Registered Professional Engineer

Date _____

Registration No. _____ State _____

Contingency Plans For An Oil Discharge

East Poplar Unit H Battery and Wells EPU Nos. 22, 32, 55, 101, & 104

The field is visited twice daily by the pumper. Visual inspection is made on each facility on each visit to determine if any malfunction is occuring. The most likely potential oil discharges are checked thoroughly. Periodically, the field foreman, Mr. Gerald Hagadone, will conduct a close check of the entire facility.

The pumpers, Mr. Ferdinand Charette and Mr. Robert Atkinson, have been instructed in the operations and maintenance of equipment to prevent oil and water discharges and informed of the applicable pollution control laws, rules and regulations. If an oil discharge occurs, the pumper will immediately close the proper valves and/or shut down the production facility to stop the discharge. He will then call Mr. Gerald Hagadone who will in turn inform Mr. Bill Brown, District Superintendent. If needed, the proper state and federal agencies will be notified by Mr. Brown. The discharged oil will be reclaimed or disposed of by approved engineering procedures and in accordance to law.

In the event discharged oil collects on standing water such as a stock pond or rain water standing in a low spot, the oil will be pumped into a tank truck. The skim of oil left on the water will be removed by an oil skimmer owned by Murphy Oil Corporation. The skimmer can be towed to the field within an hours time.

If the discharge is in excess of 50 barrels of oil, the Montana Department of Health and Environmental Sciences in Helena will be notified by Mr. Brown.

If a Spill Event occurs as defined by federal law, the Environmental Protection Agency in Denver, Colorado will be notified by Mr. Brown.

Telephone numbers and personnel to be notified in case of an oil discharge are as follows:

Phone Numbers as listed on other copies will be included on final copy.

A.F.E. No. 53-47

AUTHORITY FOR EXPENDITURE

MURPHY CORPORATION - EAST POPLAR UNIT No. 22

C SW SW Sec. 14, Twp. 28N., Rge. 51E., Roosevelt Co., Montana

WELL DRILLING & CONSTRUCTION EXPENSE:	TO CSG.PT.	COMP. & EQUIP.	TOTAL COST
Drilling: Footage - 5900' @$8/ft.	$ 47,200	$	$ 47,200
Day Work - 2 days & 3 days @ $925/day	1,850	2,775	4,625
Loc. survey, permit & prep.	200		200
Roads, fences, cattleguard, etc.	350		350
Mud mat. & chem., incl. oil & gas	4,500		4,500
Fuel	3,500		3,500
Water	650		650
Drilling bits, baskets, etc.		125	125
Cementing casing	900	950	1,850
Coring materials & services	600		600
Testing services, incl. swabbing	1,200	300	1,500
Other logs, surveys & analyses	1,400	650	2,050
Perf. & set pkr.		650	650
Hydrafrac, acidize, etc. incl. oil		750	750
Float equip., centralizers, etc.	125	250	375
Trucking, welding & other labor	500	900	1,400
Supervision & Miscellaneous	1,500	900	2,400
Total Est. Well Drlg. & Const. Exp.	$ 64,475	$ 8,250	$ 72,725
WELL EQUIPMENT COSTS:			
Casing: 100' of 13-3/8" O.D.	$ 480	$	$ 480
Casing: 1000' of 9-5/8" O.D.	3,300		3,300
Casing: 6000' of 5-1/2" O.D.		13,200	13,200
Tubing: 6000' of 2-3/8" O.D.		3,300	3,300
Packers, etc.		600	600
Casing head & connections	300		300
Xmas tree & connections		1,200	1,200
Total Est. Well Equip. Costs	$ 4,080	$ 18,300	$ 22,380
Total Est. Cost of Well	$ 68,555	$ 26,550	$ 95,105
LEASE EQUIPMENT:			
Flow lines	$	$ 1,600	$ 1,600
Other line pipe, valves & fittings		750	750
Trucking, welding & other labor		800	800
Miscellaneous		700	700
Total Est. Cost of Lease Equip.	$ —	$ 3,850	$ 3,850
TOTAL EST. COST OF WELL & LEASE EQUIP.	$ 68,555	$ 30,400	$ 98,955

APPORTIONMENT OF TOTAL ESTIMATED COSTS

APPROVAL OF EXPENDITURE

Production Department

Requested by _____

Date _____

Approved by _____

Date _____

Executive Department

Approved by _____

Date _____

Approved

_____

By _____

Date _____

AWS-lc, 2-20-53

A.F.E. No. 53-53

AUTHORITY FOR EXPENDITURE

MURPHY CORPORATION - EAST POPLAR UNIT TANK BATTERY "H" *

2000' W of C Sec. 14, Twp 28N., Rge. 51E., Roosevelt Co., Montana

TANK BATTERY CONSTRUCTION:	TOTAL COST
Tanks, two 1000 bbls. bolted, erected	$ 7,000
Heater-treaters	5,300
Chemical pump	200
Line pipe, valves & fittings	1,500
Trucking, welding & other labor	1,600
Miscellaneous	400
Total Est. Cost	$ 16,000

APPORTIONMENT OF TOTAL ESTIMATED COSTS

APPROVAL OF EXPENDITURE

PRODUCTION DEPARTMENT

Requested by _____
Date _____

Approved by _____
Date _____

EXECUTIVE DEPARTMENT

Approved by _____
Date _____

APPROVED

_____

By _____

Date _____

AWS-lc
4-9-53

* - To serve Unit Well Nos. 20 and 22 and others to be drilled in the immediate area.

Yi e#22

55-405

A.F.E. No. ~~55-101~~

AUTHORITY FOR EXPENDITURE

MURPHY CORPORATION - EAST POPLAR UNIT #22 WORKOVER

660' from E Line & 560' from S Line SE Section 14, Twp. 28N, Rge. 51E, Roosevelt Co., Mont.

EAST POPLAR UNIT #22 WORKOVER	TOTAL COST
Move in and rig up - 24 hours	$ 650.00
Trucking	200.00
Mud	500.00
Day work - 5 days at $650.00	3,250.00
Cement Service and squeeze tool	1,175.00
Perforate C-2 Zone	600.00
Acidize	580.00
Total Estimated Cost	$6,955.00

APPORTIONMENT OF TOTAL ESTIMATED COSTS

Murphy Corporation	**14.675953%**	**$ 1,021**
Marine Oil Company	**16.772517**	**1,167**
Monsco Company	**2.096565**	**146**
Placid Oil Company	**33.546035**	**2,333**
Carter Oil Company	**16.335860**	**1,136**
Phillips Petroleum Co.	**16.335860**	**1,136**
C. F. Lundgren	**.238210**	**17**

APPROVAL OF EXPENDITURE

PRODUCTION DEPARTMENT

Requested by Gordon Kirby

Date 7-30-54

Approved by [signature]

Date 8/4/54

APPROVED

Budget Section

By L R Beasley

Date 8/9/54

EXECUTIVE DEPARTMENT

Approved by [signature]

Date _____

* - East Poplar Unit #22 was completed April 27, 1953 in the C-3 Zone. Initial production was 792 B.O.P.D. with 31 barrels of water per day. The accumulated production is 6942 barrels of oil and the current production is 23 barrels of oil per day, 95% salt water. Due to the samll amount of oil that is being recovered and the difficulty in disposing of the salt water, it is necessary that the C-3 Zone be squeezed off and the well re-completed in the C-2 Zone (intercrystalline porosity section).

Kopel

A.F.E. No. 57-5-22

AUTHORITY FOR EXPENDITURE
EAST POPLAR UNIT NO. 22 - ROOSEVELT COUNTY, MONTANA
Re-acidize "C" Zone through perforations 5882.5'-87.5'
SW SW Section 14-T28N-R51E

Pulling unit four 10 hour days	$1,000
2000 gallons acid and pump truck	1,265
Production packer and junk basket	500
Trucking	150
Miscellaneous material and labor	200
Total Estimated Cost	$3,115

This well was originally completed in the "C-3" Zone but due to an increasing high water cut, it was recompleted in the "C-1" Zone. Attempts to complete in the "C-2" Zone (intercrystalline porosity) were made but were unsuccessful. On completion of the "C-1" Zone, the well swabbed 132 BFPD, 50% oil. Present production is 6 BOPD and 84 BWPD. An acid job is needed to increase the amount of fluid.

APPORTIONMENT OF TOTAL ESTIMATED COST

Murphy Corporation	31.448470%	$ 979
Munoco Company	2.096565%	65
Placid Oil Company	33.545035%	1,045
The Carter Oil Company	16.335860%	509
Phillips Petroleum Company	16.335860%	509
C. F. Lundgren	.238210%	7

APPROVAL OF EXPENDITURE

Requested by: M2J 12-17-56
Harold D. Wilson DEC 21 1956
Division Production Supt. Date

Recommend Approval:
Staff Production Man Date

Recommend Approval:
J D Langford DEC 21 1956
Asst Division Manager Date

Recommend Approval:
Budget Supervisor Date

Approved:
Vice President-Operations Date

HM:eg
12-21-56

563
86 | 184
130
549
516
24 0

563
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79

MURPHY
EXPLORATION & PRODUCTION COMPANY

131 SOUTH ROBERTSON STREET
P.O. BOX 61780
NEW ORLEANS, LA 70161-1780
(504) 561-2811

April 1, 1996

OVERNIGHT MAIL

Bureau of Land Management
Miles City District Office
111 Garryowen Road
Miles City, Montana 59301-0940

Attn: Mr. Russel Hampton
406-232-7001

RE: **East Poplar Unit (EPU)**
Shut-in Wells
BLM #3160
Roosevelt County, Montana

Dear Mr. Hampton:

This is written as a follow-up to our February 9 letter and pursuant to your recent telephone conversation with Bruce MacArthur of our office. As you know, we have 9 wells that, with a few exceptions, we desire to hold in their current shut-in status. The fluid levels inside their casings are either at or close to the surface. However, as can be seen by the attached wellbore schematics all wells, except EPU #65, have surface casing set (±1000') through the Judith River Formation.

EPU #22 has a packer set at 5877' just above C-2 perforations 5882.5-87.5'. A 500 psig pressure test has been performed on the 2-3/8" X 5½" annulus proving the casing has mechanical integrity. The test was performed during February 1996.

We currently have no further use for E.P.U. #28. Therefore, we propose to permanently plug and abandon the well during the summer. We agree to submit a plugging plan by May 1 and P&A the well within 60 days of plan approval.

As the surface casing of EPU #65 is only set to 267', we propose to perform a pressure test on the casing to prove mechanical integrity. We plan to test the casing as part of a workover to re-establish production or by setting a cast iron bridge plug above open perforations 5852-58', 5870-76' and 5927-34'. We agree to work on this well within 90 days of this letter, i.e. before June 30.

We are currently evaluating our recent (Oct-Dec 1995) 3-D seismic shoot over the East Poplar Field. To date we have spent about $1,000,000 for the seismic and associated work, and we still plan to drill during the 3rd quarter of this year. Due to our prior commitment to the development of the Unit and upcoming work in the area, we desire to hold the remaining 6 wells in their current status until our

exploration program unfolds. These wellbores may be necessary to fully and economically exploit the exploration and development potential revealed by our 3-D seismic program. Murphy EXPRO therefore requests that we be allowed to retain EPU Nos. 16, 19, 24, 62, 94 and 96 in their current shut-in status for 2 years.

Hopefully the above sufficiently explains our current plans for the EPU and provides you the requested time frame in which we plan to systematically deal with these shut-in wells. It is Murphy's desire to avoid prematurely abandoning useable wellbores that would leave potentially recoverable oil in the ground. We are also aware of and share your concern for not jeopardizing the existing subsurface or surface environment. It is my opinion that the remaining shut-in wells are not jeopardizing the environment and the granting of our request is therefore consistent with the duties and responsibilities of the BLM. If there are any questions concerning our intentions, please write or call me in New Orleans at 504-561-2594.

Yours truly,

Sidney W. Campbell

Sidney W. Campbell
Manager, Onshore Operations

SWC/BDM/ebh

cc: Ray Reede
Poplar District Manager

(EPUSIWls.SWC)

Form 9-331 b
(August 1948)

COPY RETAINED DISTRICT OFFICE Ref 24

Budget Bureau No. 42-R358.1.
Approval expires 11-30-49.

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Indian Agency Fort Peck

Allottee Allotment No. 480

Lease No. 1-37-Ind-12878

RECEIVED
MAY 4 - 1953
U. S. GEOLOGICAL SURVEY
BILLINGS, MONTANA

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO REDRILL OR REPAIR WELL		SUBSEQUENT REPORT OF REDRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	XXX
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

April 30, 1953

Well No. 22 is located 560 ft. from {N/~~S~~} line and 660 ft. from {~~E~~/W} line of sec. 14

SW/4 SW/4 Sec. 14 (¼ Sec. and Sec. No.) | 28N (Twp.) | 51E (Range) | (Meridian)

East Poplar (Field) | Roosevelt (County or Subdivision) | Montana (State or Territory)

The elevation of the ~~derrick~~ ground floor above sea level is 2177 ft.

RECEIVED
MAY 5 1953
U. S. GEOLOGICAL SURVEY

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Ran 190 joints (5885.78') of 2 3/8", E.U.E., 4.75#, J-55, 8 rd. thd. R-2 Youngstown Tubing with 3.78' perforated nipple bull plugged on bottom. Landed 10.20' below R.K.B. Displaced mud with water and water with oil. Well would not flow. Swabbed displacement oil down to 3000'. 4-26-53

5930' PBTD. Acidized C Zone from 5908 to 5918, with 1000 gallons Dowell, regular, 15% acid. Broke formation at 2900#. Displaced 5 barrels acid per minute at 2300#. Displaced acid with oil. Over-flushed 225 gallons oil. Final pressure 1300# Flowed new, clean oil to surface 25 minutes. Cleaned in pit 80 minutes (did not get any free acid back. CSIP: 925# TSIP: 950#. Turned into tanks at 11:30 A.M., 4-27-53. Released rig at 12:00 Noon 4-27-53.

Approved MAY 4 - 1953

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Murphy Corporation

Address Box 76

Poplar, Montana

By Harold Milam

Title District Production Supt.

U. S. GOVERNMENT PRINTING OFFICE 16—84270-8

Form No. 2

GENERAL RULES
201, 202, 213,
216, 219, 233.1

(SUBMIT IN TRIPLICATE)

TO

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA

BILLINGS OR SHELBY

NOTICE!
THIS FORM BECOMES A PERMIT WHEN STAMPED APPROVED BY AN AGENT OF THE COMMISSION.

SUNDRY NOTICES AND REPORT OF WELLS

Notice of Intention to Drill		Subsequent Report of Water Shut-off	
Notice of Intention to Change Plans		Subsequent Report of Shooting, Acidizing, Cementing	
Notice of Intention to Test Water Shut-off		Subsequent Report of Altering Casing	
Notice of Intention to Redrill or Repair Well		Subsequent Report of Redrilling or Repair	
Notice of Intention to Shoot, Acidize, or Cement		Subsequent Report of Abandonment	
Notice of Intention to Pull or Alter Casing		Supplementary Well History	X
Notice of Intention to Abandon Well		Report of Fracturing	

(Indicate Above by Check Mark Nature of Report, Notice, or Other Data)

September 24, 19 54

Following is a { notice of intention to do work / report of work done } on land { owned / leased } described as follows:

LEASE 1-37-Ind-12878

MONTANA (State) Roosevelt (County) East Poplar (Field)

Well No. 22 SW SW Section 14 (m. sec.) 28N (Township) 51E (Range) M.P.M. (Meridian)

The well is located 560 ft. { ~~S~~ / N. } of South line and 660 ft. { E. / ~~W~~ } of West line of Sec. 14

The elevation of the ~~derrick~~ ground floor above the sea level is 2177 ft.

READ CAREFULLY — DETAILS OF PLAN OF WORK — READ CAREFULLY

(State names of and expected depths to objective sands; show size, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work, particularly all details results Shooting, Acidizing, Fracturing).

DETAILS OF WORK
RESULT

SEE ATTACHED SHEETS

RECEIVED
SEP 28 1954
OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA - BILLINGS

APPROVED SUBJECT TO CONDITIONS SHOWN ON REVERSE.

Approved 9-30-54 (Date)

Mark P. Turley

Title Geologist-Engineer

District Office Agent

Company MURPHY CORPORATION

By Harold Milam

Harold Milam

Title District Production Superintendent

Address B-13 Behner Building, Billings, Mont.

NOTE:—Reports on this Form to be submitted to the District Agent for Approval in Triplicate.

3

OVER

402

Form 2
Rev. 8-92

Submit In Quadruplicate To:

Montana Board of Oil and Gas Conservation

Billings or Shelby Office

ARM 36.22.307, 1003, 1004, 1011, 1013, 1103, 1222, 1301, 1306, and 1309

AUG 1999
Received
Board of Oil & Gas Cons.
State of MT / Billings

Sundry Notices and Report of Wells

Operator
Murphy Exploration & Production Company

Address
P.O. Box 547

City | State | Zip Code
Poplar | MT | 59255

Telephone Number (406) 768-3612 Telefax Number (406) 768-5497

Lease Name:
East Poplar Unit

Lease Type (Private/State/Federal):
Federal

Well Number:
No. 22

Unit Agreement Name:
East Poplar Unit

Field Name or Wildcat:
East Poplar

Location of well (1/4-1/4 section and footage measurements):
650' from the South line and 660' from the West line. SW SW Section 14, T28N, R51E

If directionally or horizontally drilled, show both surface and bottom hole locations)

Section, Township, and Range:
SW SW Section 14, T28N, R51E

API Number:
25 | 0 | 8 | 5 | 0 | 5 | 0 | 1 | 9 |
State | County | Well

Well Type (oil, gas, injection, other):
Oil Well

County:
Roosevelt

Indicate below with an X the nature of this notice, report, or other data:

Notice of Intention to Change Plans	☐	Subsequent Report of Mechanical Integrity Test	☐
Notice of Intention to Run Mechanical Integrity Test	☐	Subsequent Report of Stimulation or Chemical Treatment	☐
Notice of Intention to Stimulate or to Chemically Treat	☐	Subsequent Report of Perforation of Cementing	☐
Notice of Intention to Perforate or to Cement	☐	Subsequent Report of Well Abandonment	☐
Notice of Intention to Abandon Well (Temp.)	☒	Subsequent Report of Pulled or Altered Casing	☐
Notice of Intention to Pull or Alter Casing	☐	Subsequent Report of Drilling Waste Disposal	☐
Notice of Intention to Change Well Status	☐	Subsequent Report of Production Waste Disposal	☐
Supplemental Well History	☐	Subsequent Report of Change in Well Status	☐
Other (specify) _____	☐	Subsequent Report of Gas Analysis (ARM 36.22.1222)	☐
_____	☐	_____	☐

Describe Proposed or Completed Operations:

Describe planned or completed work in detail. Attach maps, well-bore configuration diagrams, analyses, or other information as necessary. Indicate the intended starting date for proposed operations or the completion date for completed operations.

A Cast Iron Bridge Plug will be set at 5835' and 4 sacks cement will be placed on top of it. The casing will be tested to 300#.

BOARD USE ONLY

Approved AUG 13 1999
Date

Accepted for record purposes only

Name | Title

The undersigned hereby certifies that the information contained on this application is true and correct:

August 10, 1999 Raymond Reede
Date | Signed (Agent)

Raymond Reede District Manager
Print Name & Title

EPU #22

Form 2
Rev. 8-92

Submit In Quadruplicate To:
Montana Board of Oil and Gas Conservation
Billings or Shelby Office

ARM 36.22.307, 1003, 1004, 1011, 1013, 1103, 1222, 1301, 1306, and 1309

Sundry Notices and Report of Wells

Operator
Murphy Exploration & Production Company

Address
P.O. Box 547

City: Poplar | State: MT | Zip Code: 59255-0547

Telephone Number (406) 768-3612 | Telefax Number (406) 768-5497

Location of well (1/4-1/4 section and footage measurements):
560' from the South line and 660' from the West line.
SW SW Section 14, T28N, R51E
If directionally or horizontally drilled, show both surface and bottom hole locations)

API Number: 25 | 08 | 5 | 05 | 01 | 9
State | County | Well

Well Type (oil, gas, injection, other): Oil Well

Lease Name: East Poplar Unit

Lease Type (Private/State/Federal): Federal

Well Number: No. 22

Unit Agreement Name: East Poplar Unit

Field Name or Wildcat: East Poplar

Section, Township, and Range: SW SW Section 14, T28N R51E

County: Roosevelt

OCT 1999 Received
Board of Oil & Gas Cons.
State of MT / Billings

Indicate below with an X the nature of this notice, report, or other data:

Notice of Intention to Change Plans	☐	Subsequent Report of Mechanical Integrity Test	☐
Notice of Intention to Run Mechanical Integrity Test	☐	Subsequent Report of Stimulation or Chemical Treatment	☐
Notice of Intention to Stimulate or to Chemically Treat	☐	Subsequent Report of Perforation of Cementing	☐
Notice of Intention to Perforate or to Cement	☐	Subsequent Report of Well Abandonment Temp.	☒
Notice of Intention to Abandon Well	☐	Subsequent Report of Pulled or Altered Casing	☐
Notice of Intention to Pull or Alter Casing	☐	Subsequent Report of Drilling Waste Disposal	☐
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Supplemental Well History	☐	Subsequent Report of Change in Well Status	☐
Other (specify) _____	☐	Subsequent Report of Gas Analysis (ARM 36.22.1222)	☐
_____	☐	_____	☐

Describe Proposed or Completed Operations:
Describe planned or completed work in detail. Attach maps, well-bore configuration diagrams, analyses, or other information as necessary. Indicate the intended starting date for proposed operations or the completion date for completed operations.

9-16-99 Set Owen C.I.B.P. at 5835'. Dump 4 sacks cement on top of bridge plug.

10-6-99 Run M.I.T. - Pressure casing to 300#, held for 30 minuted. Test witnessed by Irene Harris with the BLM.

Change well status from Shut In to Temporarily Abanoned

FOR INFORMATION PURPOSE ONLY

BOARD USE ONLY

Approved OCT 21 1999
Date

Accepted for record purposes only

Name | Title

The undersigned hereby certifies that the information contained on this application is true and correct:

October 19, 1999 Raymond Reede
Date | Signed (Agent)

Raymond Reede District Manager
Print Name & Title

Form 3160-5 (November 1994)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0135
Expires July 31, 1996

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other Instructions on reverse side

5. Lease Serial No. I37-IND-12878
6. If Indian, Allottee or Tribe Name: Fort Peck
7. If Unit or CA/Agreement, Name and/or No.: East Poplar Unit
8. Well Name and No.: EPU No. 22
9. API Well No.: 25-085-05019
10. Field and Pool, or Exploratory Area: East Poplar
11. County or Parish, State: Roosevelt, Montana

1. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other
2. Name of Operator: Murphy Exploration & Production Company
3a. Address: P.O. Box 547, Poplar, MT. 59255-0547
3b. Phone No. (Include area code): 406+768-3612
4. Location of Well (Footage, Sec., T., R., M., or Survey Description):
560' from the South line and 660' from the West line
SW SW Section 14, T28N, R51E

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other Set Bridge Plug
	☐ Change Plans	☐ Plug and Abandon	☒ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

A Cast Iron Bridge Plug will be set at 5835' and 4 sacks cement will be placed on top of it. The casing will be tested to 300#.

AUG 1999

14. I hereby certify that the foregoing is true and correct
Name (Printed/Typed): Raymond Reede
Title: District Manager
Signature: Raymond Reede
Date: August 10, 1999

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by [signature] Title AFM - Minerals Date AUG 2_ 1999

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office: See Attached for Conditions of Approval

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on reverse)

OP

Form 3160-5
(November 1994)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0135
Expires July 31, 1996

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on reverse side

5. Lease Serial No.
I-37-IND-12878

6. If Indian, Allottee or Tribe Name
Fort Peck

7. If Unit or CA/Agreement, Name and/or No.
East Poplar Unit

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
No. 22

2. Name of Operator
Murphy Exploration & Production Company

9. API Well No.
25-085-05019

3a. Address
P.O. Box 547
Poplar, MT. 59255-0547

3b. Phone No. *(include area code)*
406+768-3612

10. Field and Pool, or Exploratory Area
East Poplar

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
560' from the South line and 660' from the West line
SW SW Section 14, T28N, R51E

11. County or Parish, State
Roosevelt Montana

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☒ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☐ Plug and Abandon	☒ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

9-16-99
Set Owen C.I.B.P. at 5835'. Dump 4 sacks cement on top of bridge plug

10-6-99
Run M.I.T. - Pressure casing to 300#, held for 30 minutes. Test witnessed by Irene Harris with the BLM.

Change well status from Shut In to Temporarily Abandoned.

14. I hereby certify that the foregoing is true and correct
Name *(Printed/Typed)*
Raymond Reede

Title
District Manager

Signature
Raymond Reede

Date
October 19, 1999

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by
Acting
Bernice Knopp

Title
AFM - Minerals

Date
OCT 2 1999

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office
See Attached for Conditions of Approval

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

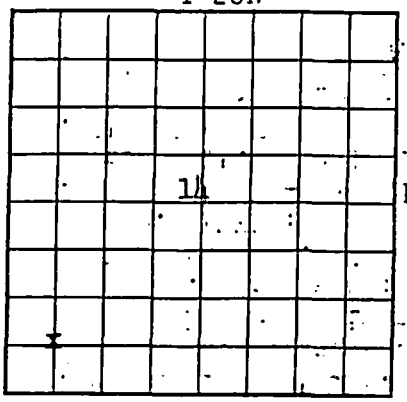
(Instructions on reverse)

DP

Budget Bureau No. 42-R355.2.
Approval expires 12-31-52.

Form 9-330

U. S. LAND OFFICE Billings
SERIAL NUMBER 1-37-ind-12878
LEASE OR PERMIT TO PROSPECT ____



LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Murphy Corporation Address Box 76, Poplar, Montana
Lessor or Tract East Poplar Unit Field East Poplar State Montana
Well No. 22 Sec. 14 T. 28N R. 51E Meridian Principal County Roosevelt
Location 560 ft. {N/S} of S Line and 560 ft. {E/W} of W Line of Sec. 14 Elevation 2190 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Harold D Milam

Date May 1, 1953 Title District Production Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling March 20, 1953 Finished drilling April 27, 1953

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from B-1 5727 to 5735 No. 4, from ____ to ____
No. 2, from B-2 5745 to 5760 No. 5, from ____ to ____
No. 3, from C 5892 to 5920 No. 6, from ____ to ____

IMPORTANT WATER SANDS

No. 1, from ____ to ____ No. 3, from ____ to ____
No. 2, from ____ to ____ No. 4, from ____ to ____

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
9 5/8	36#	8 rd.	American	1004.03	Larkin				Surface
5 1/2	15.50#	8 rd.	"	5929.30	"		5908	5918	Oil String

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
9 5/8	1017.03	400	Pump & Plug		
5 1/2	5941.00	250	Pump & Plug		

PLUGS AND ADAPTERS

Heaving plug—Material ____ Length ____ Depth set ____
Adapters—Material ____ Size ____

SHOOTING RECORD

FOLD | MARK

9 5/8	1017.03	400	Pump & Plug		
5 1/2	5941.00	250	Pump & Plug		

FOLD | MARK

PLUGS AND ADAPTERS

Heaving plug—Material ..... Length ..... Depth set .....

Adapters—Material ..... Size .....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 5942 feet, and from ..... feet to ..... feet

Cable tools were used from ..... feet to ..... feet, and from ..... feet to ..... feet

DATES

....., 19..... Put to producing April 27, 19 53

The production for the first 2 hours was 82 barrels of fluid of which 95.6% was oil; 4.4 % emulsion; ..... % water; and ..... % sediment. Gravity, °Bé. .....

If gas well, cu. ft. per 24 hours ..... Gallons gasoline per 1,000 cu. ft. of gas .....

Rock pressure, lbs. per sq. in. .....

EMPLOYEES

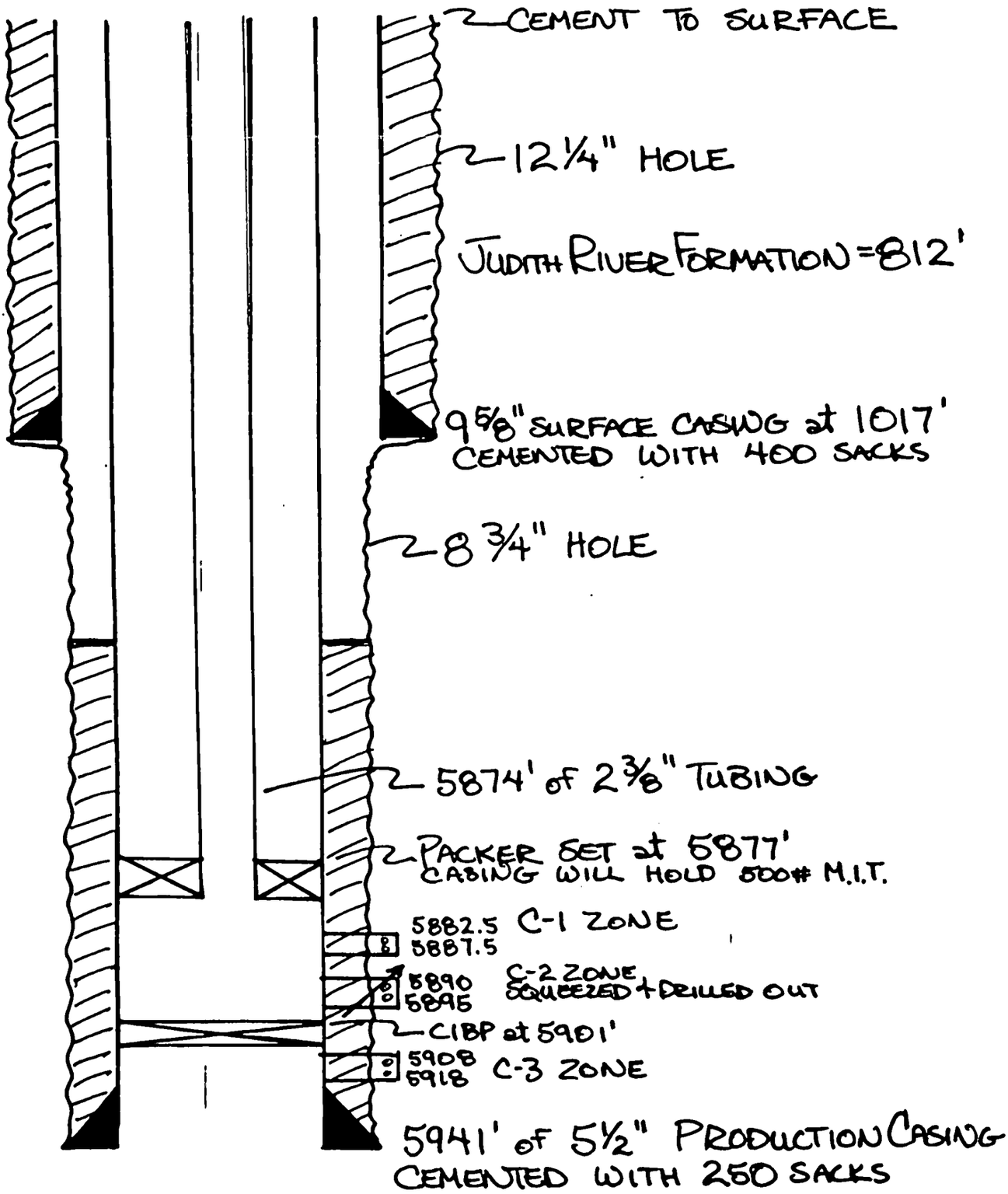
R. M. Ogburn, Driller H. E. Wilson, Driller

N. W. Strain, Driller ....., Driller

FORMATION RECORD

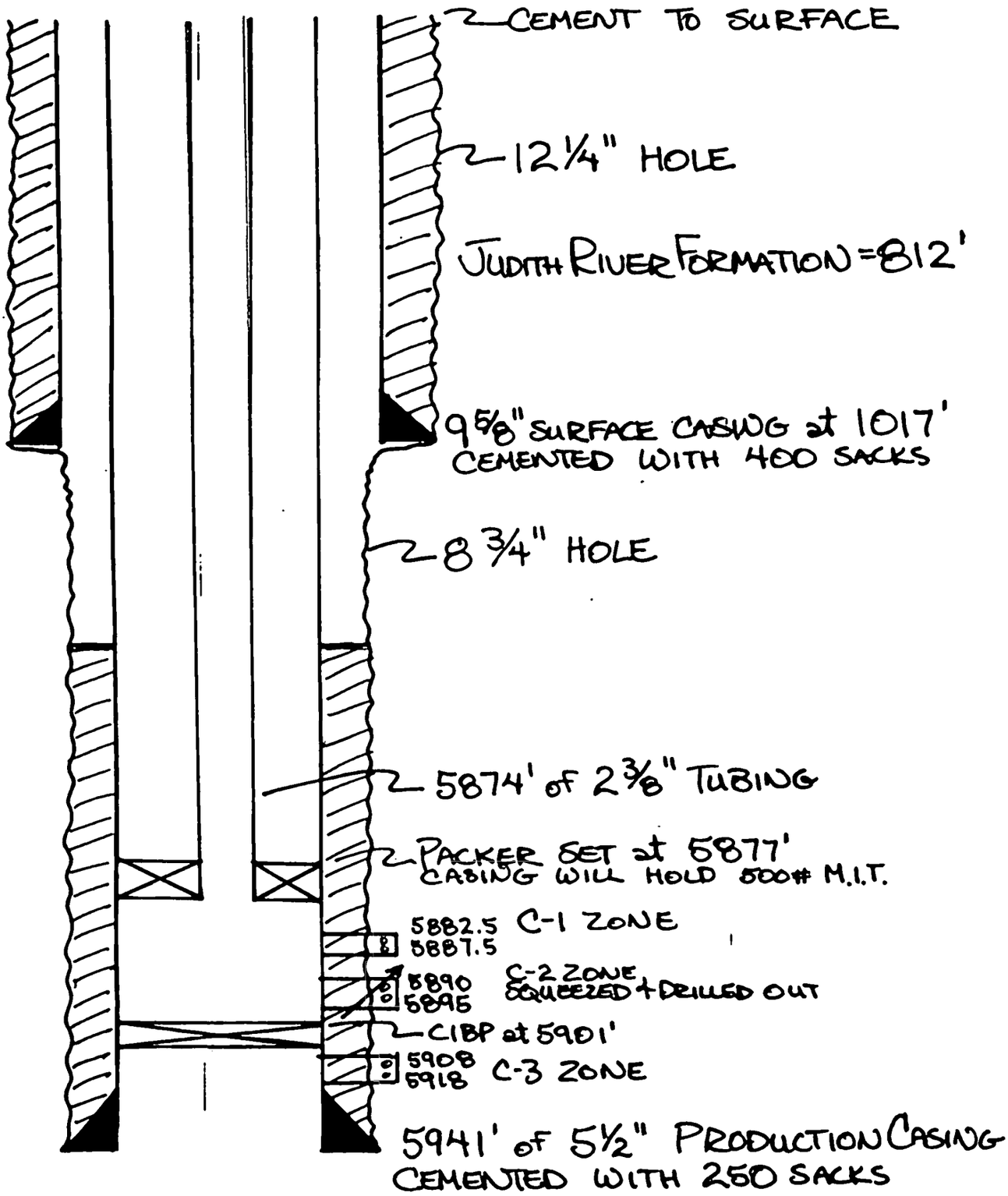
FROM—	TO—	TOTAL FEET	FORMATION
			SCHLUMBERGER DEPTHS
Eagle	1209		Piper Shale 4345
Niobrara	2070		Piper Limestone 4420
Greenhorn	2419		Gypsum Springs 4475
Graneros	2624		Spearfish 4670
Upper Muddy	2779		Amsden 4750
Muddy	2997		Heath 4920
Skull Creek	3041		Otter 5073
Dakota Silt	3220		Kibbey Sand 5228
Morrison	3598		Kibbey Limestone 5366
Swift	3660		Madison 5469
Rierdon	3987		

(OVER)



MURPHY EXPLORATION & PRODUCTION COMPANY

E.P.U. # 22
SW SW Sec 14-T28N-R51E
EAST POPLAR FIELD
ROOSEVELT Co., MONTANA
MARCH '96



MURPHY
EXPLORATION & PRODUCTION COMPANY

E.P.U. # 22
SW SW Sec 14-T28N-R51E
EAST POPLAR FIELD
ROOSEVELT CO., MONTANA
MARCH '96

DRILLING BIT AND TOTCO RECORD

Run No.	Make	Size	Type	Serial No.	From	To	Totco Footage	Degrees
1	Hughes	12 1/4"	OSC-3-J	5431	0	1031	120'	1/2°
							750'	1/2°
2	"	8 3/4"	"	48833	1031	2470	2470	1/2°
3	"	"	"	56625	2470	2982	2975	1°
4	"	"	OSC-1-J	18929	2982	3265	3242	1°
5	"	"	"	18331	3265	3507		
6	"	"	OSC-J	18593	3507	3621	3547	1/2°
7	"	"	"	62230	3621	3705	3705	1°
8	"	"	OSC	28941	3705	3910	3910	1 1/2°
9	"	"	"	76109	3910	4096		
10	"	"	"	76083	4096	4373		
11	"	"	OWV	81445	4373	4484	4484	3/4°
12	"	"	"	68507	4484	4629		
13	"	"	"	68750	4629	4812	4812	3/4°
14	"	"	"	68435	4812	4930	4930	3/4°
15	"	"	W7R	47316	4930	5059	4936	3/4°
16	"	"	OWV	81424	5059	5144	5144	3/4°
17	"	"	"	68955	5144	5280	5352	1/4°
18	"	"	OW	34965	5280	5361	5352	1/4°
19	"	"	"	50279	5361	5470	5361	1/4°
20	"	"	OWV-J	49596	5470	5550	5550	1/4°
21	"	7 7/8"	OWS	41508	5603	5715	5715	1/4°
22	"	"	OWS	57406	5750	5850	5850	1/4°

DIAMOND CORE BIT RECORD

Core No.	Make	Size	Serial No.	From	To	Footage
1	Christensen	7 7/8"	J-1847	2983	2994	11'
2	Christensen	"	"	2994	3020	26'
3	Christensen	"	"	3020	3025	5'
4	Christensen	"	"	4930	4960	30'
5	Christensen	"	"	4960	4990	30'
6	Christensen	"	"	4990	5021	31'
7	Christensen	"	"	5550	5573	23'
8	Christensen	"	"	5573	5603	30'
9	Christensen	"	"	5715	5750	35'
10	Christensen	"	"	5850	5901	51'
11	Christensen	"	"	5901	5911	10'
12	Christensen	"	"	5916	5926	10'
13	Christensen	"	"	5926	5937	11'

Total Footage: 303'

E L E C T R O L O G D A T A

TYPE OF LOG	INTERVAL LOGGED
Schlumberger Electric Logs:	
Electrical Survey 2"	100-5910
Electrical Survey 5"	2000-5910
Microlog 5"	2000-5908
Microlog 25"	5500-5908
Lane-Wells Radioactivity Logs:	
Gamma-Ray	4000-5918
Neutron	4000-5928

TENTATIVE TOPS

Judith River	812	(+1378)
Eagle	1209	(+ 981)
Niobrara	2070	(+ 120)
Greenhorn	2419	(- 229)
Graneros	2624	(- 434)
Upper Muddy	2779	(- 589)
Muddy	2997	(- 807)
Skull Creek	3041	(- 851)
Dakota Silt	3220	(-1030)
Morrison	3598	(-1408)
Swift	3660	(-1470)
Rierdon	3987	(-1797)
Piper Shale	4345	(-2155)
Piper Limestone	4420	(-2230)
Gypsum Springs	4475	(-2285)
Spearfish	4670	(-2480)
Amsden	4750	(-2560)
Heath	4920	(-2730)
Otter	5073	(-2883)
Kibbey Sand	5228	(-3038)
Kibbey Limestone	5366	(-3176)
Madison	5469	(-3279)
"A" Zone	5600	(-3410)
"B-1" Zone	5727	(-3537)
"B-2" Zone	5745	(-3555)
"C" Zone Intercrystalline Porosity	5892	(-3702)

CORE DESCRIPTIONS

Core No. 1

2982-2994 — Rec. 12'

C. T. 63, 59, 45, 38, 40/ 40, 33, 54, 43, 36/ 39, 38

1'0" Shale, dark gray to black, medium soft, fissile. No Show.

6'0" Shale, medium to dark gray, medium hard, very sandy, with numerous thin streaks of light gray, very fine grained sandstone. No Show.

5'0" Shale, dark gray to black, medium soft, fissile. No Show.

Core No. 2

2994-3020 — Rec. 18'

C. T. 29, 29, 27, 23, 34/ 48, 40, 39, 26, 20/ 27, 29, 49, 47, 40/ 48, 30, 18, 20, 17/ 16, 16, 16, 15, 12/ 17

* 4'6" Sandstone, dark gray with numerous streaks of light gray, very fine grained, well sorted, micaceous, slightly argillaceous; very slight porosity, questionable permeability. No Show.

3'6" Shale, dark gray to black, medium hard, firm, slightly micaceous, very slightly silty. No Show.

* 3'0" Sandstone, light gray, fine grained, well sorted, rounded grains, very slightly argillaceous, fairly well cemented with argillaceous cement; fair porosity and permeability. No Show.

6'6" Shale, dark gray to black, medium hard, firm, very sandy in top 3 feet, slightly micaceous. No Show.

* 0'6" Sandstone, greenish-gray, medium grained, poorly cemented, fairly well sorted, subrounded grains,; numerous fairly large (1/8" to 1/4"), well rounded chert pebbles; very slightly glauconitic; numerous small black minerals giving a salt and papper appearance; good porosity and permeability. No Show.

Note: * - Analyzed by Chemical & Geological Laboratories.

Core No. 3

3020-3025 — Rec. 13½'

C. T. 8, 17, 22, 20, 18/

*13'6" Sandstone, light gray, fine grained, rounded to sub-rounded, well sorted, porous and permeable, slightly glauconitic; numerous small black specks giving a salt and papper appearance, no taste or odor; no show.

Core No. 4

4930-4960 Rec. 30'

C. T. 35, 31, 31, 32, 29/ 30, 26, 32, 29, 24/ 32, 32, 29, 26, 26/ 30, 27, 26, 30, 27/ 31, 31, 25, 30, 27/ 24, 27, 24, 38, 101/

8'0" Shale, reddish-brown, medium soft, firm, very slightly silty; occasional thin stringer of fine grained, angular sandstone, very slightly calcareous. No Show.

3'0" Shale, reddish-brown, medium hard, very sandy, with numerous thin streaks of fine to medium grained, angular sandstone, very slightly calcareous. No Show.

19'0" Shale, reddish-brown, with numerous large spots of light gray, medium firm, very slightly calcareous, very slightly sandy, becoming very sandy in streaks; occasional 1/2" streak of gray, medium grained, angular, well sorted sandstone. No Show.

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Core No. 5

4960-4990 Rec. 20'

C. T. 29, 28, 29, 26, 30/ 30, 27, 34, 33, 32/ 31, 38, 32, 20, 21/ 19, 21, 19, 20, 38/ 22, 21, 41, 30, 38/ 33, 44, 38, 36, 42/

18'6" Shale, reddish-brown, with occasional large spot of light gray, medium hard, firm, very slightly calcareous, very silty and sandy, occasional very thin streak of light gray, fine grained sandstone. No Show.

1'6" Limestone, reddish-brown, conglomerate, very sandy; numerous fairly large, well rounded limestone pebbles. No Show.

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Core No. 6

5006-5021 Rec. 13½'

C. T. 30, 16, 15, 17, 19/ 19, 20, 29, 25, 19/ 20, 24, 22, 26, 24/

* 4'6" Sandstone, light brownish-gray, medium grained, fairly well sorted, subrounded to angular grains, very slightly glauconitic, fair prosity and permeability, fairly well cemented; single fairly well developed, tight, vertical fracture running length of unit; good oil odor and light brown stain throughout; good, even, bright golden fluorescence.

* 4'6" Sandstone, light gray, fine to medium grained, fairly well sorted, angular to subrounded, well cemented with gypsum, fair porosity, and questionable permeability, very slightly glauconitic; single well developed, tight fracture in top 1 foot; unit looks wet. No Show.

4'6" Shale, reddish-brown, soft, fairly firm.

Note: * - Analyzed by Conventional method.

Core No. 7

5550-5573 Rec. 23'

C. T. 46, 37, 19, 50, 45/ 46, 25, 23, 33, 30/ 25, 10, 12, 22, 23/ 28, 25, 28, 26, 22/ 12, 12, 22

1'6" Limestone, brownish-gray, microcrystalline, hard, dense; occasional 1 inch streak of light gray, fine crystalline, porous dolomite bleeding oil, otherwise no show.

1'6" Dolomite, light gray, earthy, very bentonitic; numerous irregular thin black, calcareous shale partings; entire unit looks wet, very slightly porous, questionably permeable. No Show..

0'6" Anhydrite, light gray, very fine crystalline, medium soft; fragmental with some earthy dolomite partings.

8'6" Limestone, light brownish-gray, fine crystalline, medium hard, dense; numerous small white veinlets of selenite; numerous paper-thin black shale partings having slickenside appearance.

2'6" Limestone, light gray, earthy, slightly doloritic, slightly bentonitic, very slightly porous, questionably permeable; occasional thin irregular black, carbonaceous shale partings. No Show.

7'6" Limestone, brownish-gray, fine crystalline, hard, dense; occasional black stylolite; occasional short, fairly tight, vertical fracture with occasional small vug along fracture bleeding oil; otherwise no show.

1'0" Limestone, light gray, same as above 2'6" unit; no show.

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Core No. 8

5573-5603 Rec. 29'

C. T. 120, 41, 39, 29, 17/ 23, 20, 27, 23, 19/ 20, 22, 21, 21, 21,/ 21, 22, 21, 19, 16/ 24, 20, 24, 31, 25/ 21, 30, 32, 33, 34/

18'0" Dolomite and anhydrite; light gray, earthy dolomite and light gray, fine crystalline anhydrite, very highly contorted; numerous 1" to 2" angular fragments of light gray anhydrite surrounded by earthy dolomite; dolomite looks wet. No Show.

5'0" Anhydrite, light gray, fine crystalline; soft, waxy, occasional paper-thin, calcareous shale parting. No Show.

* 6'0" Limestone, dark brownish-gray, amorphous; dense, except for numerous short, tight, irregular fractures; good oil odor and bright, uneven milky white fluorescence along fracture planes; good oil stain along fracture planes.

Note: * - Analyzed by Chemical & Geological Lab; full diameter.

Core No. 9

5715-5750 Rec. 35'

C. T. 20, 25, 23, 26, 14/ 19, 19, 13, 10, 11/ 11, 18, 26, 25, 50/ 23, 24, 23, 23, 22/ 23, 26, 18, 19, 19/ 28, 22, 21, 23, 22/ 24, 22, 22, 20, 20/

3'0" Anhydrite, medium gray, fine crystalline; numerous paper-thin shale partings. No Show.

* 2'6" Limestone, dark brownish-gray, amorphous to microcrystalline with thin streak of pseudo-oolitic near center of unit, fair vuggy porosity and permeability, spotty, dull golden-yellow fluorescence; fair oil odor; some free oil bleeding from an occasional pin-point vug.

* 2'0" Limestone, dark brownish-gray, microcrystalline, fairly dense, with occasional short, tight fracture; fair oil odor and spotty golden-yellow fluorescence; no show in mass of unit.

* 4'0" Limestone, brownish-gray, fine to medium crystalline, fair intercrystalline porosity and permeability; fair oil odor and fairly even dull, golden yellow fluorescence.

9'6" Anhydrite, light gray, fine crystalline; numerous irregular paper-thin calcareous shale partings. No Show.

* 1'0" Limestone, dark brownish-gray, microcrystalline, fairly dense except for occasional short, tight, vertical fracture and occasional small pin-point vug; very slight oil odor; occasional spot of dull yellow fluorescence in mass of unit with fairly even, dull golden-yellow fluorescence along fracture planes.

* 4'0" Limestone, brownish-gray, microcrystalline, very slight intercrystalline porosity, questionable permeability; fairly numerous small brown calcite crystals; faint oil odor on fresh break; spotty, dull golden-yellow fluorescence; entire unit looks wet.

* 9'0" Limestone, brownish-gray, amorphous to microcrystalline, with occasional thin 2" streak of fine crystalline; dense, with occasional 2" streak having very slight porosity and questionable permeability; faint oil odor and spotty dull golden-yellow fluorescence; entire unit looks wet.

Note: * Analyzed by Chemical & Geological Lab; both full diameter and conventional methods)

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Core No. 10

5850-5901 Rec. 51'

C. T. 35, 31, 30, 25, 23/ 20, 21, 23, 20, 22/ 20, 20, 22, 19, 18/ 20, 18, 21, 19, 18/ 19, 19, 19, 19, 19/ 18, 18, 19, 20, 19/ 18, 18, 16, 9, 10/ 9, 9, 10, 10, 10/ 12, 19, 18, 21, 26/ 26, 28, 25, 25, 25/ 30

Core No. 10 continued:
5850-5901 Rec. 51'

5'0" Dolomite, dark brownish-gray, microcrystalline, very hard, dense; single thin light gray stringer of fine crystalline anhydrite at top. No Show.

8'0" Limestone, brownish-gray, micro to fine crystalline, medium hard, dense, except for occasional thin tight hairline vertical fracture cemented with selenite; very faint oil odor along some fracture planes; even, dull, golden-yellow fluorescence along some fracture planes.

1'0" Dolomite, dark brownish-gray, microcrystalline, hard, dense; very slightly pyritic. No Show.

0'6" Dolomite and anhydrite, light gray, dolomite, and dark gray anhydrite; fine crystalline dolomite and fine crystalline anhydrite.

1'0" Dolomite, dark gray to black, amorphous, hard, dense, very slightly pyritic. No Show.

1'0" Anhydrite, brownish-gray, fine to medium crystalline, medium hard. No Show.

3'0" Limestone, brownish-gray, fine crystalline, medium hard, dense, very pyritic. No Show.

1'0" Dolomite, light brownish-gray, amorphous to microcrystalline, very hard, dense. No Show.

1'0" Limestone, brownish-gray, fine to medium crystalline, medium hard, dense, very micaceous and pyritic. No Show.

0'6" Limestone, light and dark brownish-gray bands, medium soft, very slight porosity, questionable permeability, fine crystalline, unit looks wet. No Show.

0'6" Dolomite, light gray, amorphous, dense. No Show.

7'0" Limestone, brownish-gray, fine crystalline, medium hard, dense; occasional well-developed tight vertical fracture cemented with selenite. No Show.

* 2'0" Limestone, dark brownish-gray, fine crystalline, medium hard, dense, except for single well developed vertical fracture with fair oil odor and even bright greenish fluorescence along fracture planes; numerous black stylolitic partings. No Show in mass of unit.

#10'0" Limestone, dark brownish-gray, fine crystalline, very slight porosity questionable permeability; fair oil odor on fresh break, even dull, golden-yellow fluorescence; numerous well developed tight vertical fractures throughout, with good oil odor and fluorescence along fracture planes.

Core No. 10 continued:
5850-5901 Rec. 51'

* 1'0" Limestone, brownish-gray, fine crystalline, hard, dense, except for single fairly well developed vertical fracture running length of unit; faint oil odor and fair even dull yellow fluorescence along fracture planes. No Show in mass of unit.

5'0" Limestone, dark brownish-gray, fine crystalline, medium hard, dense, no fracturing and no show.

** 3'6" Limestone, dark brownish-gray, fine crystalline, medium hard, dense, except for several fairly well developed vertical fractures; good oil odor and even milky green fluorescence along fracture planes; all show along fracture planes.

Note: * - Analyzed by Chemical & Geolog. Lab; conventional method.
** - Analyzed by Chemical & Geolog. Lab; full diameter (Porosity & Permeability only)

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Core No. 11

5901-5911 (5911' = 5916' SIM) Rec. 8'

C. T. 24, 21, 17, 26, 23/ 25, 30, 27, 25, 35/

7'6" Limestone, brownish-gray, medium crystalline, hard, dense, except for several well developed open vertical fractures with fracture planes covered with 1/8 to 1/4" selenite crystals; fair oil odor and fairly even greenish-yellow fluorescence along fracture planes; well developed fractures seem to have been washed by mud; numerous short, hairline fractures with good oil odor and greenish-yellow fluorescence along fracture planes.

0'6" Limestone, as above, except for absence of any fracturing. No Show.

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Core No. 12

5916-5926 Rec. 11'

C. T. 22, 22, 25, 23, 24/ 23, 25, 24, 22, 27/

* 1'6" Limestone, brownish-gray, fine crystalline, medium hard, dense, very slightly pyritic, single black stylolitic parting, very slightly fossiliferous; faint sulphurous odor on fresh break. No Show.

* 9'6" Limestone, dark brownish-gray, fine crystalline, with numerous coarse brown crystals of calcite; dense, except for several very tight, incipient vertical fractures; occasional black stylolitic parting, very slightly pyritic, slightly fossiliferous; faint oil odor and even, fairly bright, milky fluorescence along fracture planes; all show along tight fractures; faint sulphurous odor on fresh break.

Core No. 13

5926-5937 Rec. 12'

C. T. 35, 30, 25, 30, 29/ 23, 27, 27, 26, 25/ 26

5'6" Limestone, brownish-gray, fine to medium crystalline, with numerous small brown crystals of calcite, very fossiliferous; very hard and dense, except for single short (3") fracture about 3 feet from top of unit; some free oil bleeding from this fracture; good oil odor and bright milky fluorescence along fracture plane; otherwise entire unit is hard and dense.

6'6" Limestone, dark gray to black, micro to fine crystalline; very hard, dense; very fossiliferous with some pyritized spirifers. No Show.

D R I L L S T E M T E S T S

DST #1, 3014-3025, with HOWCO formation packer set at 3014; tool open at 6:51 PM; open for 30 minutes with strong blow of air throughout test; tool closed at 7:21 PM; shut-in for 15 minutes. Recovered: 925' fresh water with no shows of oil or gas, chlorides 600 ppm. IBHFP: 65# FBHFP: 425# SIBHP: 1140# Hydro: 1610#.

DST #2, 5004-5008.50', with Johnston Tool and straddle packers, 1/2" bottom choke, no water cushion; tool open at 1:25 PM, 4-8-53, for 1 hour; no shut-in (not enough space between packers for pressure bomb); tool open with strong blow which decreased to weak blow at end of test. Recovered: 1860' clear salt water with trace of oil in top stand only. Bottom packer failed to effect a complete shut-off. Pressure bomb showed a gradual decrease in pressure.

DST #3, 5592-5603, with Johnston Tool, 1/2" bottom choke, no water cushion; tool open at 5:46 PM, 4-15-53, for 168 minutes; tool closed for 20 minutes. Tool open with good blow, which increased to strong blow in 10 minutes. Gas to surface in 159 minutes; salt water to surface, with slight trace of oil, in 168 minutes. Bottom 90 feet black sulphur water-cut mud. IBHFP: 225# FBHFP: 2775# BHSIP: 2950# Hydro: 3275#.

DST #4, 5901-5916, with Halliburton Tool, 5/8" bottom choke, no water cushion; tool open at 2:32 PM, 4-20-53, for 135 minutes; tool closed for 20 minutes. Tool open with good blow which increased to strong blow in 10 minutes. Recovered: 2433' total fluid; 1147' clean oil, 1286' oil and gas cut mud with free oil. Note: Bottom 248' had more free oil than gas cut mud, no show of water. IBHFP: 60# FBHFP: 930# BHSIP: 988# Hydro: 3380#.

CORE ANALYSIS REPORTS

Well No. East Poplar Unit #22 Date March 30, 1953 Lab. No. 33

Formation Muddy Sand Depths 2994-3025

Sample No.	Depth Feet	Effective Porosity %PoreSpace	Permeability Millidarcies Horizontal	Permeability Millidarcies Vertical	Saturations % Pore Space Resid. Oil	Saturations % Pore Space Total Water
	Core No. 2					
1	2994.0-2995	14.9	0.01		2.1	70.5
2	95.0-96.0	9.7	0.03		5.4	84.5
3	96.0-97.0	20.9	0.24		Tr.	55.5
4	97.0-98.0	19.2	1.0		Tr.	38.0
5	98.0-98.5	19.2	0.09		Tr.	58.9
Missing	98.5-3002.0	Not received for analysis.				
6	3002.0-03.0	13.7	0.07		Tr.	70.8
7	03.0-04.0	18.8	0.05		Tr.	51.1
8	04.0-05.0	11.6	0.01		Tr.	71.6
Missing	05.0-11.5	Not received for analysis.				
9	11.5-12.0	23.0	7.5		0.0	40.9
	Core No. 3					
10	3012.0-13.0	24.2	23.0		Tr.	51.7
11	13.0-14.0	24.6	26		0.0	62.2
12	14.0-15.0	26	47		0.0	49.6
13	15.0-16.0	23.5	18		0.0	59.6
14	16.0-17.0	25.6	19		0.0	56.6
15	17.0-18.0	23.5	18		Tr.	46.0
16	18.0-19.0	23.8	14		Tr.	44.1
17	19.0-20.0	23.4	13		Tr.	43.2
18	20.0-21.0	25.3	60		0.0	39.9
19	21.0-22.0	25.3	27		0.0	36.4
20	22.0-23.0	25.3	20		0.0	40.3
21	23.0-24.0	25.0	28		0.0	42.0
22	24.0-25.0	24.9	30		0.0	38.6
	Core No. 6	Formation Heath Sd.		Depths 5006-5015		
23	5006-07	14.8	123		13.2	27.7
24	07-08	13.4	144		10.2	40.3
25	08-09	12.2	110		16.0	47.5
26	09-10	13.8	80		0.7	65.2
27	10-10½	14.9	53		0.0	71.1
28	10½-11	10.6	3.5		0.0	74.5
29	11-12	10.5	12		0.0	69.5
30	12-13	2.4	0.06		0.0	95.8
31	13-14	8.6	11		0.0	69.8
32	14-15	7.8	3.5		0.0	56.4

CORE ANALYSIS REPORTS

Date April 21, 1953 Formation Madison: B-1, B-2, C Zones Depths 5718-5894

Sample No.	Depth Feet	Effective Porosity %PoreSpace	Permeability Millidarcies Horizontal	Permeability Millidarcies Vertical	Saturations % Pore Space Resid. Oil	Saturations % Pore Space Total Water
	"B-1" Zone					
33	5718-5719	8.4	0.46		17.9	52.4
34	19-20	18.2	2.5		4.4	57.7
35	20-21	9.3	1.9		6.5	43.0
36	21-22	0.8	0.07		00.0	12.5
37	22-23	9.1	0.45		9.9	35.2
38	23-24	13.0	2.8		11.5	32.3
39	24-25	10.1	0.53		3.9	67.3
40	25-26.5	10.9	0.54		13.8	35.8
	"B-2" Zone					
41	5736-37	4.7	0.03		19.1	78.7
42	37-38	6.0	0.36		3.3	75.0
43	38-39	19.0	4.2		9.5	57.8
44	39-40	13.2	1.2		2.3	74.2
45	40-41	9.2	0.24		1.1	64.1
46	41-42	8.9	0.21		0.0	49.4
47	42-43	4.5	0.57		0.0	95.6
48	43-44	8.2	0.19		Tr.	59.8
49	44-45	7.8	0.66		Tr.	89.7
50	45-46	9.7	0.90		2.1	74.2
51	46-47	11.3	0.59		Tr.	61.9
52	47-48	7.8	0.26		1.3	44.9
53	48-49	11.5	4.9		4.3	32.2
54	49-50	14.0	2.0		2.9	52.1
	"C" Zone					
55	5882-83	3.6	-0.01		11.7	50.8
56	83-84	10.5	0.01		22.6	26.3
57	84-85	12.1	0.05		40.5	42.5
58	85-86	16.8	0.12		30.8	34.8
59	86-87	13.3	0.08		20.5	49.9
60	87-88	9.4	0.09		48.7	47.9
61	88-89	10.8	0.06		11.5	70.4
62	89-90	10.4	0.07		27.3	44.2
63	90-91	13.8	0.24		22.4	25.5
64	91-92	10.9	0.08		24.1	38.9
65	92-93	8.6	0.03		17.0	55.1
66	93-94	0.6	-0.01		Tr.	62.9

FULL DIAMETER CORESTUDY Formation Madison; "A" Zone Depths 5596-5602 Date April 17, 1953

Sample No.	Representative Of Feet	Midpoint of Sample	Footage	Permeability Radial	Permeability Vertical	Effective Porosity %	Density Bulk	Density Matrix	Saturation %PoreSpace Resid. Oil	Saturation %PoreSpace Water
1	Core No. 8	(5573-5603)	(5596-5602) Test Section							
1	5596-5597		1	F-No Test	20	2.3	2.63	2.69	Tr.	26.1
2	5597-5598		1	5000 -	80	5.0	2.59	2.73	Tr.	18.0
3	5598-5599		1	5000 -	105	7.3	2.49	2.67	8.2	26.0
4	5599-5600		1	1.02	1.5	3.1	2.63	2.72	Tr.	6.5
5	5600-5601		1	378	12	3.9	2.62	2.72	0	10.3
6	5601-5602		1	0.25	1.6	3.4	2.66	2.75	0	11.8

Formation Madison: "C" Zone Depths 5915-5926 Date April 23, 1953

	Core No. 12	5916-5926	Rec. 11 feet							
7	5915.0-5916.0		1.0	-0.01	-0.01	2.1	2.69	2.74	9.5	50.9
8	16.0-17.0		1.0	N.T.*	0.38	1.1	2.68	2.71	Tr.	0.0
9	17.0-18.0		1.0	-0.01	-0.01	1.2	2.68	2.71	Tr.	14.2
10	18.0-19.0		1.0	-0.01	5000 ≠	2.1	2.68	2.74	Tr.	0.0
11	19.0-20.0		1.0	5000 ≠	5000 ≠	3.5	2.66	2.75	0.0	6.9
12	20.0-21.0		1.0	2.4	0.03	2.6	2.66	2.73	Tr.	13.8
13	21.0-22.0		1.0	0.02	0.01	1.5	2.67	2.71	0.0	1.3
14	22.0-23.0		1.0	0.01	-0.01	2.6	2.68	2.75	Tr.	7.3
15	23.0-24.0		1.0	0.09	-0.01	2.7	2.68	2.75	Tr.	14.1
16	24.0-25.0		1.0	-0.01	5000 ≠	3.1	2.65	2.73	0.0	10.6
17	25.0-26.0		1.0	-0.01	-0.01	1.1	2.68	2.71	0.0	7.3

* - No test - Fractured in operation.

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COMPLETION DATA

Total Depth: 5937' Driller equals 5940' casing measurements equals 5942' Schlumberger equals 5940' Lane-Wells. PBTD: 5930' Driller equals 5930' Lane-Wells.

Ran 192 joints (5929.30') 5½", 15.50#, J-55, 8 rd. thd. German and American casing; landed 11.70' below RKB; Larkin float shoe at 5941 and 5908.02; 3 Larkin latch-on centralizers at 5700, 5840 and 5929; one hundred feet (100') of HOWCO scratchers at:

5706 to 5726
5733 to 5743
5752 to 5772
5877 to 5892
5898 to 5908
5912 to 5927
5929 to 5939

Cemented casing with 250 sacks of Pozmix and Ideal cement, mixed with 2% gel. Bumped plug with 1200#; released pressure and held okay. Plug down at 9:30 P.M., 4-22-53. Pipe rotated freely throughout job.

Tested 5½" casing with 1000# for 30 minutes; held okay. Top of cement at 5879' Lane-Wells; float collar at 5906 feet. Drilled to 5930 feet (TD Driller). Conditioned mud to 10.4#. Ran Gamma Ray-Neutron and Collar Log, (TD 5930' Lane-Wells).

Perforated interval, 5908-5918, with four jet shots per foot. (Lane-Wells measurements).

Ran 190 joints (5885.78') of 2 3/8" EUE, 4.70#, J-55, 8 rd. thd. R-2 Youngstown tubing with 3.78 feet perforated nipple bull plugged on bottom; landed 10.20 feet below RKB. Tubing spaced as follows:

Landed below RKB	10.20'
Top joint tubing	31.21'
189 joints tubing	5854.59'
Perforated nipple bull plugged	3.78'
Bottom of tubing	5899.78'

Displaced mud with water, and water with oil; well would not flow. Swabbed displacement oil down to 3000 feet. Swabbed 130 barrels of oil into test tank, (54 barrels displaced oil, 76 barrels from formation), fluid level while swabbing remained at 3000 feet; swabbed only clean oil.

Acidized "C" Zone from 5908-5918 with 1000 gallons of regular acid; formation broke at 2900#. Displaced 5 barrels per minute at 2300#. Displaced acid with oil. Over-flushed 225 gallons of oil, final pressure was 1300#. Flowed new clean oil to surface in 25 minutes. Cleaned to pits for 80 minutes, (did not get any free acid back). CSIP: 925# TSIP: 950#

Turned into tanks at 11:30 A.M., 4-27-53.
Released rig at 12:00 O'Clock noon, 4-27-53.

COMPLETION DATA continued:

SUMMARY OF COMPLETION DATA

Casing: Ran 192 joints (5929.30') of 5½" casing; landed 11.70' below RKB.

Tubing: Ran 190 joints (5885.78') of 2 3/8" EUE tubing with 3.78' perforated nipple bull plugged on bottom; landed 10.20' below RKB. Bottom of tubing at 5899.78'.

Perforations: Perforated interval, 5908-5918, w/4 jet s.p.f. (Lane-Wells measurements).

Acid Treatment: Acidized "C" Zone w/1000 gallons of Dowell, regular 15% acid.

Type of Completion: Single producer: "C" Zone flows through tubing.

PRODUCTION TEST DATA

INITIAL PRODUCTION TESTS

(5908' to 5918')

Zone	Hours	Choke	FP	SIP	BS&W	Fluid	Water	Oil	Date
C Zone (Tubing)	2	20/64"	200#		4.4	82.29	3.62	78.67	4-27-53
C Zone (Tubing)	4	16/64"	275#		4.0	132.69	5.31	127.38	4-27-53
C Zone (Tubing)	9	12/64"	475#	835#	14.0	210.95	29.53	181.42	4-27-53
B Zone (Casing)	Closed			925#					4-27-53

MUD PROGRAM SUMMARY

Total Mud Additives Used: Aquagel, 169 sacks; Barafos, 2 sacks; Lime, 4 sacks; Baroid, 28 sacks; Caustic Soda, 32 cans; Driscose, 11 sacks; Tannex, 89 sacks.

Mud Cost: $2567.85
Drayage Cost: $ 97.00

Total Cost: $2664.85

Drilled surface hole to a depth of 1029' with water. Ran and set 24 joints of 9 5/8" surface casing at 1017' without difficulty. Drilled out from under surface with water and used native mud with small additions of Aquagel while coring and drilling to 4000 feet. Began converting to "red" mud with regular additions of Caustic Soda and Tannex at 4000 feet. This mud program was followed to a total depth of 5942 feet with small additions of Lime and Driscose used for water loss control.

Ran 192 joints of 5½" casing and set at 5941' without difficulty. No unusual mud problems occurred while drilling this well.

Mud characteristics while drilling follow:

Depth	Weight	Viscosity	Water loss	PH
1740	9.0#/gal.	32 sec.	50 cc.	10.5
3020	10.45#/gal.	46 sec.	9 cc.	8.0
3715	10.80#/gal.	40 sec.	7.6 cc.	7.0
3940	10.40#/gal.	40 sec.	7.0 cc.	8.5
4484	10.20#/gal.	40 sec.	8.0 cc.	10.5
4770	10.15#/gal.	49 sec.	11.6 cc.	11.5
4961	10.5#/gal.	48 sec.	12.6 cc.	10.5
5065	10.5#/gal.	48 sec.	11.8 cc.	10.0
5303	10.75#/gal.	45 sec.	13.0 cc.	10.5
5509	10.7#/gal.	45 sec.	11.0 cc.	10.5
5640	10.7#/gal.	46 sec.	10.0 cc.	11.0
5835	10.3#/gal.	49 sec.	16.5 cc.	11.0

SAMPLE DESCRIPTION

200-2060	Shale, dark gray, medium soft, firm, slightly pyritic; some soft white sandy chalk.
2060	Sample Top: Niobrara.
2060-2320	Shale, brownish-gray, medium hard, firm, very calcareous; numerous small light brown to tan calcareous specks; some firm, medium gray shale; some dirty white sandy, chalky limestone.
2320-2410	Shale, light gray, medium hard, firm, splintery; trace of pyrite; some dark gray, calcareous shale with numerous small tan specks.
2410	Sample Top: Greenhorn.
2410-2470	Shale, dark gray, medium soft, firm; some medium gray, firm, calcareous shale with fairly numerous small tan to light brown, calcareous specks; trace of white, waxy bentonite; occasional aragonite prism.
2470-2480	Shale, as above, with trace of fine grained, light gray, porous sandstone.
2480-2530	Shale, medium gray, soft, firm; some medium hard, dark gray, calcareous shale; trace of aragonite; some medium to light gray speckled shale.
2530-2570	Shale, light greenish-gray, medium soft; some medium gray, medium hard, calcareous shale with numerous small tan and white specks; trace of dirty white bentonite; trace of aragonite.
2570-2635	Shale, as above, with some light gray, soft, sandy shale; trace of aragonite prisms.
2635-2680	Shale, dark gray, medium soft, firm, slightly calcareous; trace of fine to medium grained, light gray, porous sandstone; trace of pyrite; trace of aragonite prisms.
2680-2720	Shale, dark gray, medium hard, firm, slightly calcareous; some light gray, firm, splintery, non-calcareous shale; trace of white bentonite.
2720-2785	Shale, light gray, medium hard, firm, splintery; some dark gray calcareous shale.
2785	Sample Top: Upper Muddy.
2785-2800	Siltstone, light gray, medium soft, porous and permeable; some light gray, splintery shale; trace of white bentonite; trace of aragonite.

SAMPLE DESCRIPTION

2800-2940 Shale, dark gray, medium hard, firm, non-calcareous; some light gray siltstone; trace of light gray, splintery shale; trace of white bentonite; trace of light gray, fine grained sandstone.

2940-2960 Siltstone, light gray, soft, porous and permeable; some dark gray medium hard, firm, non-calcareous shale; trace of white bentonite.

2960-2975 No samples.

2975 Depth correction: 2975 equals 2982 SLM.

2982-2994 Core No. 1, recovered 12 feet.

2994-3020 Core No. 2, recovered 18 feet.

3020-3025 Core No. 3, recovered 13½ feet.

3025-3050 Sandstone, light gray, fine grained, well sorted, rounded, very porous and permeable; some light and dark gray, firm shale.

3050-3190 Shale, dark gray to black, firm, fissile.

3190-3235 Shale, dark gray, firm, chunky; trace of light gray, splintery shale.

3235 Sample Top: Dakota Silt.

3235-3240 Shale, dark gray to black, firm, slightly splintery; some light gray, coarse siltstone.

3240-3305 Sandstone, light gray, very fine grained, subrounded to rounded, well sorted, fairly well cemented, fair to good porosity and permeability; some dark gray, firm, non-calcareous shale.

3305-3450 Shale, dark gray to black, medium hard, firm; some light gray, fine to medium grained, porous sandstone; trace of pyrite.

3450-3530 Shale, as above, with trace of light gray, fine to medium grained, porous sandstone; trace of pyrite.

3530-3550 Sandstone, light gray, fine grained, rounded to subrounded, well sorted, slightly porous and permeable; some dark gray to black, splintery shale.

3550-3590 Shale, dark gray to black, splintery; trace of fine grained, light gray sandstone.

3590-3610 Shale, as above, with some light gray, fine grained sandstone.

3610-3630 Sandstone, light gray, medium grained, well sorted, subrounded, porous and permeable; some dark gray to black, splintery shale.

3630-3660 Shale, dark gray to black, medium hard, firm, splintery; trace of light gray, fine grained sandstone.

SAMPLE DESCRIPTION

3660	Sample Top: Swift.
3660-3690	Sandstone, light gray, fine grained, well cemented, well sorted, rounded grains, glauconitic, very tight, calcareous; some dark gray, splintery shale.
3690-3745	Sandstone, dirty gray, very fine grained, well cemented, calcareous, glauconitic, slightly micaceous.
3745-3800	Shale, dark gray, medium hard, firm, splintery, calcareous; some light to medium gray, fine grained, calcareous and glauconitic sandstone.
3800-3985	Shale, dark gray and light gray, firm, splintery, slightly calcareous, fissile; trace of light gray, fine grained, glauconitic sandstone.
3985	Sample Top: Rierdon.
3985-4030	Sandstone, light gray, fine grained, well sorted, rounded, well cemented, calcareous, very slightly porous, questionably permeable.
4030-4110	Shale, light gray and dark gray, medium firm, splintery; some medium soft, brownish-gray shale, with numerous small pyrite nodules; trace of firm red shale.
4110-4175	Shale, light greenish-gray, firm, splintery; some brownish-gray soft, chunky shale; trace of dark brownish-red shale.
4175-4200	Shale, brownish-gray, medium soft, slightly pyritic, slightly sandy; some firm, light greenish-gray, splintery shale.
4200-4260	Shale, light gray to greenish-gray, firm, slightly calcareous, splintery; some dark gray, chunky shale; trace of light brownish gray, fine crystalline, dense limestone.
4260-4282	Shale, as above, with some brown, fine crystalline, dense limestone; some very soft, brown, porous limestone with good stain; good bright golden-yellow fluorescence.
4275-4335	Shale, light to medium gray, medium soft, slightly pyritic; some dense, brown amorphous limestone.
4335	Sample Top: Piper Shale.
4335-4365	Shale, dark red, soft, very silty; some splintery greenish-gray, slightly calcareous shale; trace of soft white anhydrite.
4365-4415	Shale, light gray, medium hard, firm, slightly calcareous; some red, silty shale; trace of dense brown and fine crystalline gray limestone.
4415	Sample Top: Piper Limestone.

SAMPLE DESCRIPTION

4415-4450	Limestone, dark brown, amorphous to very fine crystalline, dense; some light greenish-gray, slightly calcareous, splintery shale; trace of pyrite.
4450-4465	Limestone, light gray, very fine crystalline, medium soft, very sandy, approaching a calcareous sandstone; numerous rounded, well sorted quartz grains imbedded in a fine crystalline limestone.
4465	Sample Top: Gypsum Springs.
4465-4540	Shale, greenish-gray, firm, splintery, very slightly calcareous; trace of medium firm, red sandy shale.
4540-4550	Shale, greenish-gray, as above, with some gray granular limestone; trace of soft, white anhydrite; trace of dark red silty shale.
4550-4570	Limestone, dark gray and brown, amorphous to fine crystalline, hard, dense; some soft, light gray gypsum; some dark gray, splintery shale; trace of red silty shale.
4570-4585	Shale, medium gray, firm, splintery, medium hard; trace of dark red, silty shale.
4585-4596	Limestone, light gray, fine crystalline, soft; numerous small crystals of clear calcite; some dark gray, splintery shale; trace of white anhydrite.
4596-4625	Shale, greenish-gray, splintery, slightly calcareous, slightly pyritic; trace of light gray, soft crystalline limestone; trace of reddish-brown shale.
4625-4630	Limestone, tan to light brownish-gray, soft, slightly porous, questionable permeable; numerous small clear crystals of calcite, amorphous to microcrystalline.
4630	Sample Top: Spearfish.
4630-4640	Shale, red, very soft, silty; some soft, white anhydrite.
4640-4650	Sandstone, red, very fine grained, medium hard, slightly porous, questionable permeable; some gray and green shale; trace of white anhydrite.
4650-4670	Shale, greenish-gray and green, medium firm, splintery, very slightly calcareous.
4670-4730	Sandstone, red, very fine grained, very slightly porous, questionably permeable, well sorted, rounded grains; some medium gray splintery, slightly calcareous shale; trace of medium gray, amorphous limestone.
4730-4750	Shale, medium gray, firm, slightly calcareous, slightly pyritic; some red, fine grained sandstone; trace of light gray, medium crystalline, dense limestone.

SAMPLE DESCRIPTION

4750	Sample Top: Amsden.
4750-4770	Dolomite, pink, micro to fine crystalline, medium soft, dense; some medium gray, slightly calcareous, splintery shale; trace of red, fine grained sandstone.
4770-4780	Shale, medium gray, slightly calcareous, splintery; trace of pink crystalline dolomite; trace of red, fine grained sandstone.
4780-4790	Dolomite, pink, fine crystalline, soft, dense; some gray, splintery shale; trace of soft white anhydrite.
4790-4800	Limestone, light gray, fine to medium crystalline, medium hard, very slightly porous, questionably permeable; some brown, dense limestone; some pink crystalline dolomite; trace of soft, white anhydrite.
4800-4810	Shale, medium gray, splintery, slightly calcareous; some light gray, medium crystalline limestone; trace of dense brown micro-crystalline limestone; trace of white anhydrite.
4810-4830	Limestone, light gray, medium crystalline, very slightly porous, questionably permeable; some pink, fine crystalline dolomite; some red, green, gray and purple waxy shale.
4930-4840	Shale, medium gray, splintery, slightly calcareous; some green, red and purple waxy shale; some light gray, medium crystalline limestone.
4840-4875	Limestone, brownish-gray, micro to fine crystalline, dense, slightly fossiliferous; some red, gray, green waxy shale; trace of soft white anhydrite.
4875-4910	Shale, red, green, gray, purple; waxy, splintery; some red and gray variegated; trace of brownish-gray, fine crystalline, fossiliferous limestone.
4910	Sample Top: Heath.
4910-4930	Shale, medium gray, firm, slightly calcareous; some red and green waxy shale; trace of light gray, fine crystalline, fossiliferous limestone.
4930-4960	Core No. 4, recovered 30 feet.
4960-4990	Core No. 5, recovered 21 feet.
4990-5003	Shale, light gray, firm, slightly splintery, very slightly calcareous; some dark reddish-brown, silty shale; trace of reddish-brown, coarse grained, angular, argillaceous sandstone.
5003-5006	Sandstone, light gray, medium grained, angular, well sorted; good oil stain and fluorescence; good porosity and permeability; some gray, splintery, slightly calcareous shale; trace of dark red, silty shale.

5006-5021 Core No. 6, recovered 13½ feet.

5021-5025 Shale, medium gray, firm, very slightly silty; some red, silty shale; trace of fine to medium grained, angular porous sandstone.

5025-5030 Shale, red-brown, medium hard, firm, slightly silty, micaceous.

5030-5040 Shale, light gray, medium firm, slightly silty; some red to brown, silty shale; trace of pink, fine crystalline dolomite; trace of brown, microcrystalline limestone.

5040-5060 Shale, as above, with some light gray, fine to medium crystalline, well cemented, angular sandstone; trace of light brownish-gray microcrystalline limestone.

5060 Sample Top: Otter.

5060-5090 Shale, light gray, firm, slightly micaceous, calcareous; some red silty shale; trace of vivid green, waxy shale; trace of light gray, dense, microcrystalline limestone.

5090-5100 Limestone, light gray and brownish-gray, medium soft, micro- to fine crystalline; some greenish-gray, calcareous shale.

5100-5110 Shale, medium gray, firm, calcareous; some dark gray and brownish-gray, fine to micro crystalline, dense limestone; trace of vivid green waxy shale.

5110-5120 Limestone, light gray, microcrystalline, dense, slightly fossiliferous; some dark brownish-gray, dense, microcrystalline limestone; some greenish-gray and green shale.

5120-5145 Shale, greenish-gray, firm, calcareous, slightly pyritic; some brownish-gray and light gray, dense, microcrystalline limestone; some brownish-red silty shale; trace of green shale.

5145-5150 Shale, as above, with some soft white anhydrite; trace of gray fine crystalline, dense limestone.

5150-5160 Shale, light gray, medium firm; some red, silty shale; trace of soft white anhydrite; trace of vivid green shale.

5160-5180 Limestone, light gray, amorphous, dense; trace of soft white anhydrite; trace of red and gray shale; trace of vivid green shale.

5180-5185 Shale, red and gray, medium firm, slightly splintery; some dense, gray, amorphous to fine crystalline limestone; trace of vivid green shale.

5185-5215 Limestone, light gray, fine crystalline, medium hard, dense to very slightly porous; some brownish-red silty shale; trace of vivid green shale.

5215	Sample Top: Kibbey Sandstone.
5215-5220	Sandstone, light red, fine grained, subrounded, tight, cemented with gypsum.
5220-5225	Shale, dark brownish-red, firm, silty; some light gray, dense, microcrystalline limestone.
5225-5230	Sandstone, light gray to white, medium crystalline, sub-angular, good porosity and permeability; good oil stain and fluorescence on some sand grains; some red silty shale; trace of light gray, microcrystalline limestone.
5230-5250	Shale, red to brown, silty; some light red, fine grained, tight sandstone.
5250-5255	Sandstone, light gray, medium grained, subrounded, good porosity and permeability; good oil stain and fluorescence; some red, silty shale; trace of light gray, fine crystalline limestone.
5255-5265	Shale, dark reddish-brown, silty, firm; some medium grained, red sandstone; trace of light gray, fine crystalline limestone; trace of pyrite; trace of pink, fine crystalline dolomite.
5265-5300	Sandstone, light red to pink, fine grained, sub-angular, poorly sorted, very slightly porous, questionably permeable; well cemented with soft, light gray to pink anhydrite; some brown-red silty shale; trace of light gray, fine crystalline limestone and pink, fine crystalline dolomite.
5300-5350	Sandstone, light red, fine to medium grained, subrounded, poorly sorted, frosted grains, very slightly porous, questionably permeable; some reddish-brown, silty shale; trace of light greenish-gray, splintery shale.
5350-5360	Sandstone, very light red to pink, very fine grained, silty, tight; some pink and white soft anhydrite.
5360	Sample Top: Kibbey Limestone.
5360-5385	Limestone, light gray, fine crystalline, medium soft; numerous large, dark brown inclusions of dolomite; trace of soft white anhydrite.
5385-5405	Shale, light greenish-gray, splintery, firm; some red, silty shale; trace of red fine to medium grained sandstone.
5405-5450	Sandstone, red, very fine grained, rounded, poorly sorted, frosted grains, tight; some red-brown, silty shale; some greenish-gray, splintery shale; some red siltstone; trace of red, fine-medium grained, poorly sorted sandstone.
5450-5470	Siltstone, red, soft; some greenish-gray, splintery shale.
5470	Sample Top: Madison.

SAMPLE DESCRIPTION

5470-5515 Siltstone, light red, soft; some soft, white anhydrite; trace of dense, fine crystalline, brownish-gray limestone.

5515-5530 Limestone, light brownish-gray, fine crystalline, dense, argillaceous; some soft, white, fine crystalline anhydrite; trace of light gray, dense, fine crystalline dolomite.

5530-5550 Limestone, brown, microcrystalline, dense; some soft, white, crystalline anhydrite; trace of dense, light gray, amorphous dolomite.

5550-5573 Core No. 7, recovered 23 feet.

5573-5603 Core No. 8, recovered 29 feet.

5503-5615 Limestone, medium gray, micro to fine crystalline, hard, dense; some light grey, calcareous anhydrite, slightly pyritic; some light gray, fine crystalline dolomite; trace of red to brown, silty shale.

5515-5627 Limestone, dark brownish-gray, oolitic, medium soft; some gray, fine crystalline, dense limestone; trace of white, soft anhydrite; trace pyrite.

5527-5635 Dolomite, light gray, fine crystalline, medium soft, very slightly porous, very calcareous; some red to brown, silty shale; some gray oolitic limestone; trace of white anhydrite.

5635-5645 Shale, red, brown, very silty, slightly calcareous; some gray, porous dolomite; trace of soft, white anhydrite.

5615-55 Anhydrite, white, soft, fine crystalline; some light gray, fine crystalline dolomite; some brownish-gray, amorphous limestone; some red and brown silty shale.

5655-5665 Dolomite, light gray, fine crystalline, porous, medium soft; some red to brown silty shale; trace of soft, white anhydrite; trace of brownish-gray, dense limestone.

5665-5674 Anhydrite, white, soft, fine crystalline; some red to brown silty shale; some light gray, porous dolomite; trace of dense brownish-gray limestone.

5674-5678 Salt; amorphous, clear, very soft, very anhydritic; some soft white anhydrite; trace of light gray dolomite and dense, brownish-gray, amorphous limestone.

5678-5700 Anhydrite, white, fine crystalline, soft, very salty; some gray dolomite and brownish-gray, amorphous limestone.

5700-5715 Limestone, dark brownish-gray, amorphous, hard dense; some light gray, amorphous dolomite; trace of soft white anhydrite.

SAMPLE DESCRIPTION

5715-5750 Core No. 9, recovered 35 feet.

5750-5765 Limestone, dark brownish-gray, amorphous, dense; trace of light gray, sandy dolomite.

5765-5773 Dolomite, light gray, fine crystalline, porous, sandy; some brownish-gray, amorphous limestone; trace of soft, white anhydrite.

5773-5790 Limestone, dark brownish-gray, fine crystalline, dense; some light gray, fine crystalline dolomite; trace of soft, white, fine crystalline anhydrite.

5790-5800 Anhydrite, light gray to white; soft, fine crystalline; some brownish-gray, fine crystalline limestone; trace of light gray fine crystalline dolomite.

5800-5850 Limestone, brownish-gray, amorphous to fine crystalline; medium hard, dense; some light gray, fine crystalline dolomite; trace of soft, white anhydrite.

5850-5901 Core No. 10, recovered 51 feet.

5901-5911 Core No. 11, recovered 8 feet.
Depth correction: 5911 equals 5916 SLM.

5916-5926 Core No. 12, recovered 11 feet.

5926-5937 Core No. 13, recovered 12 feet.

Total Depth: 5937' Driller equals 5940' Casing measurements.

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EAST POPLAR UNIT #22 WORKOVER
Section 14, T28N, R51E
Roosevelt County, Montana

OCT 2 - 1954

August 5, 1954: Moving in workover rig to squeeze off "C-3" Zone and re-complete in "C-2" (intercrystalline) Zone.

August 7, 1954: Mixing mud to kill well.

August 8, 1954: Set Baker Model "K" Cast Iron retainer at 5901' on wire line by Lane-Wells. Squeeze No. 1 broke formation with 1200#. Mixed 75 sacks Slo-set cement, maximum pressure 1200#. Would not build up. Cleared perforations with 5 barrels of water. Will wait 6 hours and resqueeze.

August 9, 1954: Stage squeezing. Stage No. 2 mixed 75 sacks, maximum pressure 1000#. Cleared tool and waited 6 hours. Stage No. 3 mixed 100 sacks, maximum pressure 2400#. Would not hold. Cleared perforations and waited 6 hours. Stage No. 4, mixed 100 sacks. Injected cement with 2200# maximum pressure, failed to hold. Cleared tool, preparing to resqueeze.

August 10, 1954: Preparing to perforate "C-2" Zone, Stage squeeze No. 5 with 100 sacks, maximum pressure 2200#, cleared perforation. Stage No. 6 with 100 sacks, pressure built to 4400 with 65 sacks in. Reversed out 35 sacks. Job complete 8:00 P.M, 8-9-54.

August 11, 1954: Preparing to acidize. Perforated "C-2" Zone with Lane-Wells 1 3/4" tubing gun from 5890-95. Tubing open ended at 5896. Swabbed 12 hours. Swabbed tubing dry. No apparent formation fluid.

August 12, 1954: Treated Well with 500 gallons of etching acid. Maximum tubing pressure 2100#. Injection rate of 4 barrels per minute, pressure broke to 1150#. 4½ barrels acid in formation. Bleed down pressure: Casing 650#, tubing 800#. Turned to tank at 8:45 A.M. Flowed to tank 9:15 A.M. Started swabbing at 9:30, swabbed out 7½ barrels acid. Swabbed displacement water 9:30 A.M. to 5:00 P.M. Started showing oil on fourth trip with swab. Average 15 to 20 barrels fluid per hour with 10 to 15 percent oil. After swabbing 12 hours fluid decreased to 2½ barrels per hour with 2 to 5 percent oil. Fluid level 4000'. Shut down swabbing from 4:00 P.M. to 7:00 A.M., 8-12-54. Splicing swab line. CP 150#.

August 13, 1954: Preparing to stratafrac. Well started flowing while repairing swab line. Flowed 6 barrels per hour with trace of oil. Circulated with oil. Flowed 11 barrels oil in 30 minutes, died. Started swabbing. Lowered fluid to 4300'. Swabbing 13 barrels of fluid per hour, 8 percent oil, 92 percent salt water.

OCT 2 - 1954

August 14, 1954: Preparing to drill cement retainer set at 4000. Loaded with oil. Stratafrac with 500 gallons jel and 1500 gallons etching acid. Maximum injection pressure, 2900#. Injected 5 barrels per minute, bleed down pressure 900#. Flowed spent acid 8 minutes. Salt water 22 minutes. Flowed 122 barrels salt water per hour with trace of oil, killed well with 10.5 mud. Started in hole with Baker Model "K" Cast Iron cement retainer set at 4000'.

August 15, 1954: Waiting 6 hours to squeeze. Pushed retainer to bottom, started out of hole. 55 stands out started flowing. Went back to 12 stands off bottom. Condition mud to 10.4. Came out of hole, ran Baker Junk Basket on sand line; Ran Baker Model "K" M set at 5870'. Attempted to squeeze with 75 sacks Slo-set. Maximum pressure 1200#. Cleared tool. Will squeeze again 6 hours.

August 16, 1954: Waiting 6 hours to squeeze, condition mud to 9 pounds to release pressure to keep from losing mud while reversed out, attempted to squeeze three times with 50 sacks of Slo-set cement each squeeze. Maximum pressure on last squeeze, 1400#.

August 17, 1954: Squeeze No. 5 with 50 sacks Slo-set, unsuccessful. Maximum pressure 1800#. Waited 6 hours. Squeeze No. 6 with 75 sacks of Slo-set cement. Unsuccessful. Maximum pressure 2000#. Waited 6 hours. Squeeze No. 7 with 75 sacks Slo-set cement, unsuccessful. Maximum pressure 2200#.

August 18, 1954: Preparing to drill cement retainer. Squeeze No. 8, 50 sacks of Slo-set cement. Unsuccessful. Maximum pressure 2400#. Squeeze No. 9, 50 sacks of Slo-set cement. Pressure built to 4600# and held. Squeeze job complete at 7:00 P.M., 8-17-54.

August 19, 1954: Swabbing. Drilled out retainer and cement. Tested perforations 5890' to 95'. Tool open with medium blow 90 minutes. Decreased to weak blow. Ran swab, found 500' fluid in tubing. Recovered on first trip with swab 400', 50 percent oil and 50 percent salt water with trace mud. Approximately 1000' gas on top fluid. Could not recover any fluid second trip. Ran swab every hour for 11 hours. Recovered 1.37 barrels fluid per hour, 50 percent oil first three hours. Decreased to 8 percent oil, 92 percent clear salt water at end of test. Showing gas each trip with swab.

August 20, 1954: Swabbing. Closed test tool 15 minutes. BHSIP--450#. Pull tubing. Ran hook wall packer with 33' tail pipe, set at 5820'. Treated formation with 500 gallons Howco MCA. Broke formation with 2600. Displaced MCA 1/2 barrels minute at 1200#. Let MCA set on formation 4 hours. Open to tank. Flowed 5 minutes, died, swabbed out 12 barrels of spent MCA and 15 barrels salt water, no oil, swabbed dry, dry 3 hours. 4th hour trip with swab found fluid at 1800'. Now swabbing to determine amount and percent oil in field.

August 21, 1954: Pulling tubing to acidize. Swabbed 19 hours. 4½ barrels fluid per hour. 10 to 30 percent oil. Swabbing from 5400' let set 4 hours. Fluid rose to 1500' of surface.

August 22, 1954: Testing, pull tubing. Ran 190 jts. 2 3/8", EUE tubing. 5880' landed 10.22' below old RKB. Open ended bottom tubing. 5890.22. Displaced water with oil. Acidized "C" Zone 5890' to 5895' with 1000 gallons Dowell etching acid. Maximum pressure 1800#. Injected 2 barrels per minute at 1800#. Bleed down pressure 1100#. Open to test tank at 7:15 P.M. Acid to surface 14 minutes. New oil and salt water 35 minutes. Open flow 73 barrels fluid per hour, 25% oil C.P. 325#, TP. 0#.

20/64" choke	22 BFPH	20% oil, TFP 475#, CP 700#
1/4" choke	14 BFPH	20% oil, TFP 500#, CP 700#
10/64" choke	8 BFPH	20% oil, TFP 500#, CP 700#

Note: Choke plugging with metal from drilled retainer. Total fluid 10 hours testing 185 barrels fluid. Average 21 percent oil. 79 percent salt water.

August 23, 1954: Preparing to squeeze. Tested 1 hour 3/4" choke, 84 BFPH, 20 percent oil. TFP 125#, CP 325#. Flowed 14 hours to tank battery through treater 20/64" choke TFP 150#, CP 550#. 10 percent oil tested in test tank 4:00 A.M. to 8:00 A.M. Average 61 BFPH, 10 percent oil, TFP 150#, CP 500#.

August 24, 1954: Waiting 6 hours to squeeze. Pull tubing. Ran Baker Junk Basket on W.L. Ran and set Baker Model "K" C. I. cement retainer on Lane-Wells W.L. at 5888'. Attempted to squeeze "C" Zone perf. 5890 to 5895' with 75 sacks Slo-set cement. Broke formation with 1200# Maximum pressure 1600#. Cleared tool, reversed out job completed 9:00 A.M., 8-24-54. Will attempt squeeze again in 6 hours.

OCT 2 - 1954

August 25, 1954: Squeezing, stage squeeze No. 2 with 75 sacks Slo-set cement. Maximum pressure 1800#. Stage squeeze No. 3 with 50 sacks Slo-set cement. Maximum pressure 2600#. Will squeeze again 9:00 A.M.

August 26, 1954: Swabbing. Squeeze No. 4 with 50 sacks Slo-set cement. Broke formation with 1800#, maximum pressure 4800#. Held okay. Reversed out 8 sacks cement. Job complete at 10:15 A.M., 8-25-54. Let set 12 hours. Reperforated "C" Zone 5882.5 to 5887.5 with Lane Wells 4 JSPF. Acidized "C" Zone 5882.5 to 5887.5 with 500 gallons Dowell etching acid. Broke formation with 2200#. Injected 1 barrel per minute at 2100#. Bleed down pressure 1700#. Open to test tank at 8:18 A.M. Flowed 2 minutes, died, started swabbing.

August 27, 1954: Swabbing. 9:00 A.M. to 9:00 P.M. swabbed 108 barrels load oil fluid level 5000'. 9:00 P.M. to 3:00 A.M. swabbed 33 barrels fluid, 50 percent oil. 8:00 A.M. to 6:00 A.M. average 5.42 barrels fluid per hour, 50 percent oil, 50 percent salt water with trace of mud.

August 28, 1954: Swabbing. From 8:00 A.M. to 1:00 P.M., average 8 BFPH, 50 to 85 percent salt water. Swabbed down fluid level 5600, let set 1 hour. Fluid rose 400'. 2:00 P.M. to 11:00 P.M. average 3 BFPH, 20 to 50 percent salt water with trace of mud. Loaded hole with oil, reacidized "C" Zone, 5882.5 to 5887.5 with 1000 gallons, 15% reg. BJ acid. Injected 1.25 barrels per minute at 2000#. No formation bleed down pressure 1500#. Open to test tank 3:15 A.M. Flowed small stream 15 minutes, died. Swabbed from 4:00 A.M. to 8:00 A.M., recovered 88 barrels displacement oil and spent acid. Last fluid level 3600'.

August 29, 1954: Rigging down. 8:00 A.M. to 8:00 P.M. swabbed average 5 to 7 BFPH, 50 to 65 percent salt water with trace of mud. Fluid level 5500'. 8:00 P.M. to 4:00 A.M. pulled tubing. Put BRL Ancor Shoe 1 jt. off bottom. 4:00 A.M. to 8:00 A.M. Swabbed 39 barrels of fluid. First trip with swab recovered 100 percent oil. Fluid level 3800'. Fluid rose 1700' 8 hours. Second trip with swab 25 percent oil on top. Last trip with swab 80 to 90 percent salt water. Released rig at 8:00 A.M. 8-29-54. Will set pumping unit. Fluid average 132 BFPD, 50 percent oil, 50 percent water with water decreasing.

WORKOVER HISTORY NO. 2

Date January 28, 1957

Lease and Well No. East Poplar Unit No. 22
Field East Poplar Unit County Roosevelt State Montana
Well Location SW SW Section 14, T28N, R51E.

Status prior to Present Job:

Date Completed April 27, 1953 Date last Workover August 29, 1954 TD 5940' PBTD 5888' Producing Zone "C" Zone of Madison Formation Perforations or Open Hole 5882.5 to 5887.5' Cumulative Production Present Zone 12,435 bbls net oil from "C" Zone Latest Test 6 BOPD with 87% water cut.

Justification for Workover:

This well was originally completed in the "C-3" zone but due to an increasing high water cut it was re-completed in the "C-1" zone. Attempts to complete in the "C-2" zone (intercrystalline porosity) were unsuccessful. On completion of the "C-1" zone, the well swabbed 132 BFPD, with 50% oil. Production before this workover was 6 BOPD and 34 BWPD. Acidization was needed to increase the amount of fluid.

Summary of Workover:

1-11-57: PBTD 5888'. Moved in and rigged up pulling unit.

1-12-57: PBTD 5888'. Pulled rods out of hole, circulated well with salt water. Picked up one single of 2 3/8" tubing and washed down to solid bottom. Ran Baker junk basket on swab line after pulling tubing. Started in hole with tubing and Howco type C production packer. Shut down for darkness.

1-13-57: PBTD 5888'. Finished running tubing. Set top of type C Howco production packer at 5877'. Spaced tubing and tested packer, well head and casing with 2700# psi. Held o.k. Acidized C zone perforations 5882.5' to 5887.5' with 2000 gallons Dowell etching acid. Formation broke at 1400 lbs psi back to 500 psi. Injected acid at rate of 5.85 BPM at 450# psi. Bleed down pressure 300# psi. Open to pit at 1:55 P.M. Spent acid to surface in 15 more minutes. Clean to pit, flowed in test tank for 30 minutes on open flow at rate of 1,512 BFPD, 85% water. (227 BOPD, 1285 BWPD). Flowed 1 hour in test tank on 1/4" choke at rate of 774 BFPD, 95% water. (39 BOPD, 735 BWPD). TFP 325#, TSIP 425 #. Opened to Battery. Flowed over night on 14/64" choke, 92% water cut.

1-14-57: PBTD 5888'. Four hour test, 14/64" choke, flowed 715 BFPD, 92% water. (57 BOPD, 658 BWPD).

1-15-57: PBTD 5888'. Two hour test, 14/64" choke, flowed 706 BFPD, 93% water. (49 BOPD, 657 BWPD.)

1-16-57: PBTD 5888'. Two hour test, 1/4" choke, flowed 967 BFPD, 97% water. (29 BOPD, 938 BWPD).

Workover History No. 2 Continued

1-17-57: PBTD 5888'. Four hour test, 12/64" choke, flowed 512 BFPD, 96% water. (20 BOPD, 492 BWPD).

1-18-57: PBTD 5888'. Four hour test, 12/64" choke, flowed 520 BFPD, 96% water (21 BOPD, 499 BWPD).

1-19-57: PBTD 5888'. Four test 10/64" choke, flowed 268 BFPD, 85% water. (40 BOPD, 228 BWPD). TFP 375#.

1-20-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 276 BFPD, 90% water. (27 BOPD, 249 BWPD). TFP 500#.

1-21-57: PBTD 5888'. Four hour test 9/64" choke, flowed 228 BFPD, 91% water. (21 BOPD, 207 BWPD). TFP 425#.

1-22-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 268 BFPD, 91% water. (24 BOPD, 244 BWPD). TFP 425#.

1-23-57: PBTD 5888'. Three hour test, 10/64" choke, flowed 260 BFPD, 91% water, (23 BOPD, 237 BWPD). TFP 425#.

1-24-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 268 BFPD, 91% water, (24 BOPD, 244 BWPD.) TFP 425#.

1-25-57: PBTD 5888'. Four test, 8/64" choke, flowed 114 BFPD, 96% water. (5 BOPD, 109 BWPD.) TFP 400#.

1-26-57: PBTD 5888'. Four test, 10/64" choke, flowed 249 BFPD, 92% water. (20 BOPD, 229 BWPD). TFP 425#. This is the initial potential after workover No. 2.

Final Summary of Workover:

1. Perforations: 5882.5' to 5887.5' (unchanged).

2. Acidization: 5882.5' to 5887.5' with 2000 gallons Dowell etching acid.

3. Final PBTD: 5888' (unchanged).

4. Initial Potential of same zone after workover:
4 hour test, 10/64" choke, flowed 249 BFPD, 92% water, (20 BOPD, 229 BWPD). TFP 425#.

5. Geolologic name of producing zone: "C" zone of Madison formation.

6. Down hole equipment: Howco type "C" production packer at 5877'
2 3/8" EUE, 4.70#, J-55, 8 rd. thd. tubing stung into packer at 5877'.

7. Results: The flow rate was increased from an average of 53 BFPD on open flow, 85% water cut, to 1,512 BFPD on open flow, 85% water cut. The water cut varies from 85-95% on different flow rates. The workover was successful in increasing production potential.

COPY RETAINED DISTRICT OFFICE

WORKOVER HISOTRY NO. 2

Date January 28, 1957

Lease and Well No. East Poplar Unit No. 22
Field East Poplar Unit County Roosevelt State Montana
Well Location SW SW Section 14, T26N, R51E.

Status prior to Present Job:

Date Completed April 27, 1953 Date last Workover August 29, 1954 TD 5940' PBTD 5888' Producing Zone "C" Zone of Madison Formation Perforations or Open Hole 5882.5 to 5887.5' Cumulative Production Present Zone 12,435 bbls net oil from "C" Zone Latest Test 6 BOPD with 87% water cut.

Justification for Workover:

This well was originally completed in the "C-3" zone but due to an increasing high water cut it was re-completed in the "C-1" zone. Attempts to complete in the "C-2" zone (intercrystalline porosity) were unsuccessful. On completion of the "C-1" zone, the well swabbed 132 BFPD, with 50% oil. Production before this workover was 6 BOPD and 34 BWPD. Acidization was needed to increase the amount of fluid.

Summary of Workover:

1-11-57: PBTD 5888'. Moved in and rigged up pulling unit.

1-12-57: PBTD 5888'. Pulled rods out of hole, circulated well with salt water. Picked up one single of 2 3/8" tubing and washed down to solid bottom. Ran Baker junk basket on swab line after pulling tubing. Started in hole with tubing and Howco type C production packer. Shut down for darkness.

1-13-57: PBTD 5888'. Finished running tubing. Set top of type C Howco production packer at 5877'. Spaced tubing and tested packer, well head and casing with 2700# psi. Held o.k. Acidized C zone perforations 5882.5' to 5887.5' with 2000 gallons Dowell etching acid. Formation broke at 1400 lbs psi back to 500 psi. Injected acid at rate of 5.85 BPM at 450# psi. Bleed down pressure 300# psi. Open to pit at 1:55 P.M. Spent acid to surface in 15 more minutes. Clean to pit, flowed in test tank for 30 minutes on open flow at rate of 1,512 BFPD, 85% water. (227 BOPD, 1285 BWPD). Flowed 1 hour in test tank on 1/4" choke at rate of 774 BFPD, 95% water. (39 BOPD, 735 BWPD). TFP 325#, TSIP 425 #. Opened to Battery. Flowed over night on 14/64" choke, 92% water cut.

1-14-57: PBTD 5888'. Four hour test, 14/64" choke, flowed 715 BFPD, 92% water. (57 BOPD, 658 BWPD).

1-15-57: PBTD 5888'. Two hour test, 14/64" choke, flowed 706 BFPD, 93% water. (49 BOPD, 657 BWPD.)

1-16-57: PBTD 5888'. Two hour test, 1/4" choke, flowed 967 BFPD, 97% water. (29 BOPD, 938 BWPD).

Workover History No. 2 Continued

1-17-57: PBTD 5888'. Four hour test, 12/64" choke, flowed 512 BFPD, 96% water. (20 BOPD, 492 BWPD).

1-18-57: PBTD 5888'. Four hour test, 12/64" choke, flowed 520 BFPD, 96% water (21 BOPD, 499 BWPD).

1-19-57: PBTD 5888'. Four test 10/64" choke, flowed 268 BFPD, 85% water. (40 BOPD, 228 BWPD). TFP 375#.

1-20-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 276 BFPD, 90% water. (27 BOPD, 249 BWPD). TFP 500#.

1-21-57: PBTD 5888'. Four hour test 9/64" choke, flowed 228 BFPD, 91% water. (21 BOPD, 207 BWPD). TFP 425#.

1-22-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 268 BFPD, 91% water. (24 BOPD, 244 BWPD). TFP 425#.

1-23-57: PBTD 5888'. Three hour test, 10/64" choke, flowed 260 BFPD, 91% water, (23 BOPD, 237 BWPD). TFP 425#.

1-24-57: PBTD 5888'. Four hour test, 10/64" choke, flowed 268 BFPD, 91% water, (24 BOPD, 244 BWPD.) TFP 425#.

1-25-57: PBTD 5888'. Four test, 8/64" choke, flowed 114 BFPD, 96% water. (5 BOPD, 109 BWPD.) TFP 400#.

1-26-57: PBTD 5888'. Four test, 10/64" choke, flowed 249 BFPD, 92% water. (20 BOPD, 229 BWPD). TFP 425#. This is the initial potential after workover No. 2.

Final Summary of Workover:

1. Perforations: 5882.5' to 5887.5' (unchanged).

2. Acidization: 5882.5' to 5887.5' with 2000 gallons Dowell etching acid.

3. Final PBTD: 5888' (unchanged).

4. Initial Potential of same zone after workover:
4 hour test, 10/64" choke, flowed 249 BFPD, 92% water, (20 BOPD, 229 BWPD). TFP 425#.

5. Geolologic name of producing zone: "C" zone of Madison formation.

6. Down hole equipment: Howco type "C" production packer at 5877'
2 3/8" EUE, 4.70#, J-55, 8 rd. thd. tubing stung into packer at 5877'.

7. Results: The flow rate was increased from an average of 53 BFPD on open flow, 85% water cut, to 1,512 BFPD on open flow, 85% water cut. The water cut varies from 85-95% on different flow rates. The workover was successful in increasing production potential.

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE, MONTANA

MURPHY CORPORATION

EAST POPLAR

UNIT # 22

April 23, 1953

CORE ANALYSIS REPORT

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE MONTANA

April 23, 1953

Murphy Corporation
El Dorado, Arkansas

Gentlemen:

The weighted average maximum permeability of Core # 12 is 1,364 millidarcies, and the weighted average porosity is 1.7 percent.

This core showed very low porosity with vertical fractures for those permeabilities which were high. There were very low traces of residual oil and also low water saturations.

Yours very truly,

CHEMICAL & GEOLOGICAL LABORATORIES OF MONTANA

J. Allan MacTaggart

J. Allan MacTaggart
Manager

JAM:ml

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

CORE # 12

CORE ANALYSIS REPORT

Field East Poplar County Roosevelt State Montana

Well No. Unit # 22 Location SW SW 14-28N-51E

Formation Depths 5915 - 5926

Operator Murphy Corporation Elevation 2190' K.B. 2177' Gr. Lab. No. 33

CORE INFORMATION

Cored with mud from 5915 to 5926

Footage of formation cored	11
Feet of core received at laboratory for analysis	11
Feet of core not accounted for	0
Number of representative samples selected for analysis	11
Feet of core represented by selected samples	11

ROCK CHARACTERISTICS	FEET OF CORE ANALYZED	FEET OF CORE NOT ANALYZED
Shale and/or dense barren material	8.0	
Fratured material	3.0	
Non-fractured material		
TOTAL	11.0	

RECORD OF DRILL STEM TESTS

REMARKS

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

CORE # 12

CORE ANALYSIS REPORT

Field East Poplar Well No. Unit # 22

Operator Murphy Corporation Laboratory No. 33

SUMMARY OF REPORT

DISTRIBUTION BY MAXIMUM PERMEABILITY RANGES

PERMEABILITY RANGE	FOOTAGE	PERMEABILITY	POROSITY	WATER SATURATION	RESIDUAL OIL SATURATION
Less that 0.01	3.0	-0.01	1.47	24.1	3.17
0.01 - 0.09	3.0	0.04	2.27	7.6	Tr
0.10 - 0.99	1.0	0.38	1.1	0.0	Tr
1.00 - 9.9	1.0	2.4	2.6	13.8	Tr
10 - 99					
100 - 999					
1,000 +	3.0	5000 +	2.9	5.8	Tr
Total summarized	11.0				
Total analyzed	11.0				
0.01 +	8.0	1875	2.4	6.8	Tr.
0.10 +	5.0	3001	2.5	6.3	Tr.
1.00 +	4.0	3751	2.8	7.8	Tr.
10 +	3.0	5000 +	2.9	5.8	Tr.
100 +	3.0	5000 +	2.9	5.8	Tr.
1.000 +	3.0	5000 +	2.9	5.8	Tr.

Total porosity-feet 19.2

Total millidarcy-feet of 0.1 md. and above 15,003

Mean matrix density 2.73

Remarks:

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537
GLENDIVE, MONTANA

FULL DIAMETER CORESTUDY

Operator Murphy Corporation Field East Poplar Formation [illegible]

Well No. Unit # 22 Location SW SW 14-28N-51E Depths 5915-5926

Elevation 2190' K.B. 2177' Gr. Date 4-23-53 Lab. No. 33

SAMPLE NO.	REPRESENTATIVE OF FEET	MIDPOINT OF SAMPLE	FOOTAGE	PERMEABILITY		EFFECTIVE POROSITY %	DENSITY		SATURATION % OF PORE SPACE		DESCRIPTION
				RADIAL	VERTICAL		BULK	MATRIX	RESIDUAL OIL	WATER	
	CORE # 12	5916-5926	Rec. 11 feet								
7	5915.0-5916.0		1.0	-0.01	-0.01	2.1	2.69	2.74	9.5	50.9	NF, D
8	16.0-17.0		1.0	N.T.*	0.38	1.1	2.68	2.71	Tr.	0.0	VC, D
9	17.0-18.0		1.0	-0.01	-0.01	1.2	2.68	2.71	Tr.	14.2	NF, D
10	18.0-19.0		1.0	-0.01	5000 -	2.1	2.68	2.74	Tr.	0.0	VF, D
11	19.0-20.0		1.0	5000 -	5000 -	3.5	2.66	2.75	0.0	6.9	VF, D
12	20.0-21.0		1.0	2.4	0.03	2.6	2.66	2.73	Tr.	13.8	VC, D
13	21.0-22.0		1.0	0.02	0.01	1.5	2.67	2.71	0.0	1.3	NF, D
14	22.0-23.0		1.0	0.01	-0.01	2.6	2.68	2.75	Tr.	7.3	NF, D
15	23.0-24.0		1.0	0.09	-0.01	2.7	2.68	2.75	Tr.	14.1	VC, D
16	24.0-25.0		1.0	-0.01	5000 -	3.1	2.65	2.73	0.0	10.6	VF, D
17	25.0-26.0		1.0	-0.01	-0.01	1.1	2.68	2.71	0.0	7.3	NF, D

N.T. - No Test - Fractured in operation
NF - No fracture
D - Dense
VF - Vertical Fracture
VC - Vertical Crack

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE MONTANA

March 21, 1953

Murphy Corporation
El Dorado, Arkansas

Gentlemen:

The weighted average maximum permeability of 'A' Zone is 1,733.5 millidarcies, and the weighted average porosity is 4.2 percent.

This zone showed average porosity with a very small showing of oil. The permeability from 5597 to 5599 was due to vertical fractures, with the remaining permeability due to vertical cracks.

Yours very truly,

CHEMICAL & GEOLOGICAL LABORATORIES OF MONTANA

J. Allan MacTaggart

J. Allan MacTaggart
Manager

JAM/ml

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL · P. O. BOX 537

GLENDIVE, MONTANA

CORE ANALYSIS REPORT

Field East Poplar County Roosevelt State Montana

Well No. East Poplar Unit # 22 Location SW SW 14-28N-51E

Formation "A" Zone Depths 5596 - 5602

Operator Murphy Corporation Elevation 2190 K.B. 2177 G.R. Lab. No. 33

CORE INFORMATION

Cored with Mud from 5593 to 5602

Footage of formation cored	30
Feet of core received at laboratory for analysis	6
Feet of core not accounted for	24
Number of representative samples selected for analysis	6
Feet of core represented by selected samples	6

ROCK CHARACTERISTICS	FEET OF CORE ANALYZED	FEET OF CORE NOT ANALYZED
Shale and/or dense barren material		
Fratured material	2	
Non-fractured material	4	
TOTAL	6	

RECORD OF DRILL STEM TESTS

DST 5592-5603 No water cushion, open 168 min., SI 20 min, gas to surface in 159 min., salt water w/slight trace oil 168 min., FP 225-2775# BHP 2950#, HP 3275.

REMARKS

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

CORE ANALYSIS REPORT "A" Zone

Field East Poplar Well No. Unit # 22

Operator Murphy Corporation Laboratory No. 33

SUMMARY OF REPORT

DISTRIBUTION BY MAXIMUM PERMEABILITY RANGES

PERMEABILITY RANGE	FOOTAGE	PERMEABILITY	POROSITY	WATER SATURATION	RESIDUAL OIL SATURATION
Less that 0 01					
0.01 - 0.09					
0.10 - 0.99					
1.00 - 9.9	2.0	1.55	3.25	9.15	Tr.
10 - 99	1.0	20	2.3	26.1	Tr.
100 - 999	1.0	378	3.9	10.3	0
1,000 +	2.0	5000 +	6.15	22.0	4.1
Total summarized	6.0				
Total analyzed	6.0				
0.01 +					
0.10 +					
1.00 +	6.0	1733.5	4.2	16.5	1.4
10 +	4.0	2600.0	4.6	20.1	2.1
100 +	3.0	3459	5.4	18.1	2.7
1.000 +	2.0	5000 +	6.15	22.0	4.1

Total porosity-feet	25.0
Total millidarcy-feet of 0.1 md. and above	10,401.1
Mean matrix density	2.71

Remarks:

CLI 20—QUICK PRINT, DICKINSON, N. D.

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537
GLENDIVE, MONTANA

FULL DIAMETER CORESTUDY

Operator Murphy Corporation Field East Poplar Formation "A" Zone

Well No. East Poplar Unit # 22 Location SW SW 14-28N-51E Depths 5596-5602

Elevation 2190'K.B. 2177' Gr. Date 4-17-53 Lab. No. 33

SAMPLE NO.	REPRESENTATIVE OF FEET	MIDPOINT OF SAMPLE	FOOTAGE	PERMEABILITY RADIAL	PERMEABILITY VERTICAL	EFFECTIVE POROSITY %	DENSITY BULK	DENSITY MATRIX	SATURATION % OF PORE SPACE RESIDUAL OIL	SATURATION % OF PORE SPACE WATER	DESCRIPTION
	CORE # 8	(5596-5602)	Test Section		Cored (5573-5603)						
1	5596-5597	5605-5611)	1	Fr.-No Test	20	2.3	2.63	2.69	Tr.	26.1	VF, S Vu, St
2	5597-5598		1	5000 +	80	5.0	2.59	2.73	Tr.	18.0	VF, S Vu, St
3	5598-5599 A-4		1	5000 +	105	7.3	2.49	2.67	8.2	26.0	VC, HC, Vu, St
4	5599-5600		1	1.02	1.5	3.1	2.63	2.72	Tr.	6.5	VC, HC, Sty, St
5	5600-5601		1	378	12	3.9	2.62	2.72	0	10.3	VC, S Vu, St
6	5601-5602		1	0.25	1.6	3.4	2.66	2.75	0	11.8	VC, Sty, St

Should test 5612-15

VF - Vertical Fracture
S Vu - Slightly Vuggy
St - Stained
VC - Vertical Crack
HC - Horizontal Crack
Sty - Stylolite

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

113 West Bell
Glendive, Montana

660' from the West Line
560' from the South ~~Line~~

CORE ANALYSIS REPORT

Company Murphy Corporation — Date 3-30 ; 4-20 — Lab. No. 33
Well No. East Poplar Unit # 22 — Location SW SW 14-28N-51E
Field East Poplar — Formation Sandstone
County Roosevelt — Depths 2994 - 5015
State Montana — Drilling Fluid Mud

LEGEND

C—Crack
F—Fracture
H—Horizontal
O—Open
NF—No Fracture
IS—Insufficient Sample
S—Slight
St—Stain
V—Vertical
Vu—Vugs

SS - Sandstone Sh L - Shaly Lenses SL - Sandy Lenses

SAMPLE NO.	LEGEND	DEPTH, FEET	EFFECTIVE POROSITY % PORESPACE	PERMEABILITY MILLIDARCIES HORIZONTAL	PERMEABILITY MILLIDARCIES VERTICAL	SATURATIONS % PORE SPACE RESIDUAL OIL	SATURATIONS % PORE SPACE TOTAL WATER	CONNATE WATER	SOLUBILITY MUD ACID	SOLUBILITY 15 % ACID
		CORE # 2								
1	Sh, SS, St	2994.0-2995	14.9	0.01		2.1	70.5			
2	Sh, Sl St	95.0-96.0	9.7	0.03		5.4	84.5			
3	ShL, SS	96.0-97.0	20.9	0.24		Tr.	55.5			
4	ShL, SS	97.0-98.0	19.2	1.0		Tr.	38.0			
5	ShL, SS	98.0-98.5	19.2	0.09		Tr.	58.9			
Missing		98.5-3002	Not received for analysis							
6	Sh, SS	3002.0-03.0	13.7	0.07		Tr.	70.8			
7	Sh, SS	03.0-04.0	18.8	0.05		Tr.	51.1			
8	Sh, SL	04.0-05.0	11.6	0.01		Tr.	71.6			
Missing		05.0-11.5	Not received for analysis							
9	Sh, SS	11.5-12.0	23.0	7.5		0.0	40.9			
		CORE # 3								
10	ShL, SS	3012.0-13.0	24.2	23.0		Tr.	51.7			
11	SS	13.0-14.0	24.6	26		0.0	62.2			
12	SS	14.0-15.0	26.0	47		0.0	49.6			
13	SS	15.0-16.0	23.5	18		0.0	59.6			
14	SS	16.0-17.0	25.6	19		0.0	56.6			
15	SS	17.0-18.0	23.5	18		Tr	46.0			
16	SS	18.0-19.0	23.8	14		Tr.	44.1			
17	SS	19.0-20.0	23.4	13		Tr.	43.2			
18	SS	20.0-21.0	25.3	60		0.0	39.9			
19	SS	21.0-22.0	25.3	27		0.0	36.4			
20	SS	22.0-23.0	25.3	20		0.0	40.3			
21	SS	23.0-24.0	25.0	28		0.0	42.0			
22	SS	24.0-25.0	24.9	30		0.0	38.6			
		CORE # 6	5015-5030 (5006 - 5021	Recovered 13⅓ feet.						
23	SS, St	5006-07	14.8	123		13.2	27.7	Heath		
24	VF, SS, St	07-08	13.4	144		10.2	40.3			
25	VF, SS, St	08-09	12.2	110		16.0	47.5			
26	VF, SS, St	09-10	13.8	80		0.7	65.2			
27	VF, SS	10-10⅓	14.9	53		0.0	71.1			
28	SH, SS	10⅓-11	10.6	3.5		0.0	74.5			
29	VF, SS	11-12	10.5	12		0.0	69.5			
30	SS	12-13	2.4	0.06		0.0	95.8			
31	SS	13-14	8.6	11		0.0	69.8			
32	Sh, SS	14-15	7.8	3.5		0.0	56.4			

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA
113 West Bell
Glendive, Montana

CORE ANALYSIS REPORT

Company Murphy Corporation — Date April 21, 1953 — Lab. No. 33
Well No. East Poplar Unit # 22 — Location SW SW 14-28N-51E
Field East Poplar — Formation B-1, B-2, C Zones
County Roosevelt — Depths 5718 - 5894
State Montana — Drilling Fluid Mud

LEGEND
C—Crack, F—Fracture, H—Horizontal, O—Open
NF—No Fracture
IS—Insufficient Sample
S—Slight, St—Stain, V—Vertical, Vu—Vugs

SAMPLE NO.	LEGEND	DEPTH, FEET	EFFECTIVE POROSITY % PORESPACE	PERMEABILITY MILLIDARCIES HORIZONTAL	PERMEABILITY MILLIDARCIES VERTICAL	SATURATIONS % PORE SPACE RESIDUAL OIL	SATURATIONS % PORE SPACE TOTAL WATER	CONNATE WATER	SOLUBILITY MUD ACID	SOLUBILITY 15 % ACID
		"B-1" Zone	5707-38							
33	I, St	5718-19	8.4	0.46		17.9	52.4			
34	S Vu, St	19-20	18.2	2.5		4.4	57.7			
35	D, Shy, St	20-21	9.3	1.9		6.5	43.0			
36	V&HC, Shy	21-22	0.8	0.07		0.0	12.5			
37	I, St	22-23	9.1	0.45		9.9	35.2			
38	I, St	23-24	13.0	2.8		11.5	32.3			
39	I, St	24-25	10.1	0.53		3.9	67.3			
40	I, St	25-25.5	10.9	0.54		13.8	35.8			
		"B-2" Zone								
41	S Vu, St	5736-37	4.7	0.03		19.1	78.7			
42	I, St	37-38	6.0	0.36		3.3	75.0			
43	I, St	38-39	19.0	4.2		9.5	57.8			
44	I, St	39-40	13.2	1.2		2.3	74.2			
45	S Vu, St	40-41	9.2	0.24		1.1	64.1			
46	SV, Shy	41-42	8.9	0.21		0.0	49.4			
47	D, Shy	42-43	4.5	0.57		0.0	95.6			
48	I, Sh, St	43-44	8.2	0.19		Tr.	59.8			
49	I, St	44-45	7.8	0.66		Tr.	89.7			
50	I, Shy, St	45-46	9.7	0.90		2.1	74.2			
51	S Vu, St	46-47	11.3	0.59		Tr.	61.9			
52	S Vu, St	47-48	7.8	0.26		1.3	44.9			
53	S Vu, St	48-49	11.5	4.9		4.3	32.2			
54	S Vu, St	49-50	14.0	2.0		2.9	52.1			
		" C " Zone								
55	D, St	5882-83	3.6	-0.01		11.7	50.8			
56	I, St	83-84	10.5	0.01		22.6	26.3			
57	I, St	84-85	12.1	0.05		40.5	42.5			
58	I, St	85-86	16.8	0.12		30.8	34.8			
59	I, Shy, St	86-87	13.3	0.08		20.5	49.9			
60	I, St	87-88	9.4	0.09		48.7	47.9			
61	I, St	88-89	10.8	0.06		11.5	70.4			
62	I, St	89-90	10.4	0.07		27.3	44.2			
63	I, St	90-91	13.8	0.24		22.4	25.5			
64	I, St	91-92	10.9	0.08		24.1	38.9			
65	I, St	92-93	8.6	0.03		17.0	55.1			
66	S, Shy, St	93-94	0.6	-0.01		Tr.	62.9			

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE, MONTANA

ROUTINE AND FULL DIAMETER

COMPARISON

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE MONTANA

April 27, 1953

Mr. B.B. Lane
Murphy Corporation
Poplar, Montana

Dear Mr. Lane:

It is our belief that full diameter analysis gives a truer, more representative, and more realistic picture of reservoir rock conditions than routine plug analysis. We hope the results herein tabulated for these 72.5 feet of core will give you an idea of the value of full diameter work.

The report covered by this letter includes:

(1) Routine plug analysis previously reported to you.

(2) Tabular work sheet of our full diameter analysis giving sample number, depths represented by the sample, footage represented by the sample, radial permeability, vertical permeability, full diameter porosity, and bulk and matrix densities.

(3) Graph showing the 17 full diameter samples arranged in order of increasing porosity as determined by full diameter methods, together with (a) porosities on same graph numbered specimens of plugs taken from adjacent material and (b) porosities on same graph numbered specimens as measured from plugs drilled from the full diameter specimens.

(4) Graph showing the 17 full diameter samples arranged in order of increasing permeabilities as determined by full diameter methods, together with (a) permeabilities on same graph numbered specimens of plugs taken from adjacent material and (b) permeabilities on same graph numbered specimens as measured from plugs taken from the full diameter specimens.

(4) Tabular data showing specimen number of the material in the graphs.

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

CHEMISTS GEOLOGISTS ENGINEERS

113 WEST BELL
GLENDIVE, MONTANA

(5) Organization sheet (Summary of Report) of the routine plug analysis.

(6) Organization sheet (Summary of Report) of the full diameter analysis.

Let me call your attention first to these two organization sheets which sum up all the data given on the work sheets. You will note that the data are tabulated by permeability ranges and that for each range a weighted permeability and porosity figure is given. For example, by routine analysis we find that there are ten feet with a permeability from 0.01 - 0.09 millidarcy and a porosity of 9.2 per cent; by full diameter analysis there are no samples with a permeability less than 0.10 millidarcies.

Thus, one can compare each permeability range, and you will note that in all ranges the full diameter analysis gives more footage.

At the bottom of this section we find that total footage analyzed and summarized consisted of 34.5 feet by routine analysis and 37.5 feet by full diameter analysis.

The next section of this summary gives total weighted summary of all footages with a permeability of 0.01 millidarcy and above. By full diameter analysis we find that there are 37.5 feet of core with a weighted average permeability of 833 millidarcies and a weighted average porosity of 8.4 per cent, whereas routine analysis shows 32.5 feet with 0.82 millidarcy and 10.4 percent.

If you do not believe that 0.01 millidarcy rock will produce, drop down to the next line. Rock of 0.10 millidarcy and greater shows for full diameter 37.5 feet of 833 md. and 8.4 porosity; routine shows 22.5 feet of 1.2 millidarcy and 10.9 porosity.

If you believe it requires at least 1.0 md. reservoir rock to produce, the next line gives 34.5 feet of 905 md. and 8.6 porosity as against routine analysis of 7.0 feet of 2.8 md. and 14.0 per cent porosity.

Total porosity-feet by both methods was relatively close -- 314.8 by full diameter as against 341.85 by routine methods. But there is an enormous difference in millidarcy-feet --31,228 by full diameter as against 26.6 by routine plug analysis.

CHEMICAL & GEOLOGICAL LABORATORIES
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113 WEST BELL
GLENDIVE, MONTANA

Thus, by using full diameter figures, one can conclude that this section of the formation - 72.5 feet - has 37.5 feet of rock with a permeability greater than 0.10 md., that these 37.5 feet have a weighted average permeability of 833 millidarcies and a weighted average of 8.4 per cent.

The graphs are included to visually demonstrate the erraticity of porosity and permeability determinations when small 3/4-inch plugs are used. The full diameter porosities and permeabilities have been arranged in order of ascending magnitude, and the 3/4-inch plug of adjacent material corresponding to the full diameter specimen has been given the same graph number. In addition, a 3/4-inch plug was drilled from the actual specimen used for full diameter analysis, and this has also been ploted on the graph.

For example graph No. 5 on the porosity data comparison shows full diameter porosity of 6.1%, the plug from full diameter with a porosity of 10.5, and the plug from the adjacent material with a porosity of 7.9%. You will note that the porosities and permeabilities taken from the adjacent material are far more erratic than the plugs drilled from the full diameter specimens.

You are probably also interested in the comparative prices of these two types of analysis. The price of the full diameter analysis with the water and oil saturations which were not included in this report would be $202.00; without the oil and water saturations it would amount to 169.75. This includes two types of permeabilities, both radial and vertical and also the bulk and matrix densities. The charge on the small plug analysis would amount to $226.50 with only the radial permeability and no densities. Of course the discrepancy is due in part to the fact that fewer samples are necessary to do the full diameter analysis.

We hope this gives you some idea of our full diameter work. We are thoroughly convinced that, for reservoir information, the full diameter method is so superior to the old routine 3/4-inch plug analysis that this new method of obtaining reservoir information should be used on all formations.

Very truly yours,

CHEMICAL & GEOLOGICAL LABORATORIES OF MONTANA

J. Allan MacTaggart

J. Allan MacTaggart,
Manager

JAM;ml

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

CORE ANALYSIS REPORT

Field East Poplar Well No. Unit # 22

Operator Murphy Corporation Laboratory No. 33

Small Plugs

SUMMARY OF REPORT

DISTRIBUTION BY MAXIMUM PERMEABILITY RANGES

PERMEABILITY RANGE	FOOTAGE	PERMEABILITY	POROSITY	WATER SATURATION	RESIDUAL OIL SATURATION
Less that 0.01	2.0	-0.01	2.1	56.9	5.9
0.01 - 0.09	10.0	0.06	9.2	46.6	23.1
0.10 - 0.99	15.5	0.43	9.5	57.0	7.3
1.00 - 9.9	7.0	2.8	14.0	49.9	5.9
10 - 99					
100 - 999					
1,000 +					
Total summarized	34.5				
Total analyzed	34.5				
0.01 +	32.5	0.82	10.4	52.3	11.9
0.10 +	22.5	1.2	10.9	54.8	6.9
1.00 +	7.0	2.8	14.0	49.9	5.9
10 +					
100 +					
1,000 +					

Total porosity-feet 341.85

Total millidarcy-feet of 0.1 md. and above 26.66

Mean matrix density 2.66

Remarks:

CHEMICAL & GEOLOGICAL LABORATORIES
OF MONTANA

113 West Bell

Glendive, Montana

CORE ANALYSIS REPORT

Company: Murphy Corporation — Date: April 21, 1953 — Lab. No. 33

Well No.: East Poplar Unit # 22 — Location: SW SW 14-28N-51E

Field: East Poplar — Formation: B-1, B-2, C Zones

County: Roosevelt — Depths: 5718 -5894

State: Montana — Drilling Fluid:

LEGEND

C—Crack, F—Fracture, H—Horizontal, O—Open

NF—No Fracture

IS—Insufficient Sample

S—Slight, St—Stain, V—Vertical, Vu—Vugs

	SAMPLE NO.	LEGEND	DEPTH, FEET	EFFECTIVE POROSITY % PORESPACE	PERMEABILITY MILLIDARCIES HORIZONTAL	PERMEABILITY MILLIDARCIES VERTICAL	SATURATIONS % PORE SPACE RESIDUAL OIL	SATURATIONS % PORE SPACE TOTAL WATER	CONNATE WATER	SOLUBILITY MUD ACID	SOLUBILITY 15 % ACID
			" B-1 " Zone								
1	33	I, St	5718-19	8.4	0.46		17.9	52.4			
	34	S Vu, St	19-20	18.2	2.5		4.4	57.7			
2	35	D, Shy, St	20-21	9.3	1.9		6.5	43.0			
1	36	V&HC, Shy	21-22	0.8	0.07		0.0	12.5			
3	37	I, St	22-23	9.1	0.45		9.9	35.2			
	38	I, St	23-24	13.0	2.8		11.5	32.3			
4	39	I, St	24-25	10.1	0.53		3.9	67.3			
5	40	I, St	25-26	10.9	0.54		13.8	35.8			
			" B-2 " Zone								
6	41	S Vu, St	5736-37	4.7	0.03		19.1	78.7			
	42	I, St	37-38	6.0	0.36		3.3	75.0			
	43	I, St	38-39	19.0	4.2		9.5	57.8			
7	44	I, St	39-40	13.2	1.2		2.3	74.2			
	45	S Vu, St	40-41	9.2	0.24		1.1	64.1			
8	46	SV, Shy	41-42	8.9	0.21		0.0	49.4			
9	47	D, Shy	42-43	4.5	0.57		0.0	95.6			
	48	I, Sh, St	43-44	8.2	0.19		Tr.	59.8			
10	49	I, St	44-45	7.8	0.66		Tr.	89.7			
	50	I, Shy, St	45-46	9.7	0.90		2.1	74.2			
11	51	S Vu, St	46-47	11.3	0.59		Tr.	61.9			
10	52	S Vu, St	47-48	7.8	0.26		1.3	44.9			
	53	S Vu, St	48-49	11.5	4.9		4.3	32.2			
12	54	S Vu, St	49-50	14.0	2.0		2.9	52.1			
			" C " Zone								
17	55	D, St	5882-83	3.6	-0.01		11.7	50.8			
13	56	I, St	83-84	10.5	0.01		22.6	26.3			
16	57	I, St	84-85	12.1	0.05		40.5	42.5			
	58	I, St	85-86	16.8	0.12		30.8	34.8			
16	59	I, Shy, St	86-87	13.3	0.08		20.5	49.9			
14	60	I, St	87-88	9.4	0.09		48.7	47.9			
	61	I, St	88-89	10.8	0.06		11.5	70.4			
15	62	I, St	89-90	10.4	0.07		27.3	44.2			
	63	I, St	90-91	13.8	0.24		22.4	25.5			
16	64	I, St	91-92	10.9	0.08		24.1	38.9			
	65	I, St	92-93	8.6	0.03		17.0	55.1			
15	66	S, Shy, St	93-94	0.6	-0.01		Tr.	62.9			

CLI 21—QUICK PRINT, DICKINSON, N. D.

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

CORE ANALYSIS REPORT

Field East Poplar Well No. Unit # 22

Operator Murphy Corporation Laboratory No. 33

FULL DIAMETER
SUMMARY OF REPORT

DISTRIBUTION BY MAXIMUM PERMEABILITY RANGES

PERMEABILITY RANGE	FOOTAGE	PERMEABILITY	POROSITY	WATER SATURATION	RESIDUAL OIL SATURATION
Less that 0.01					
0.01 - 0.09					
0.10 - 0.99	3.0	0.49	6.3		
1.00 - 9.9	21.2	5.7	9.4		
10 - 99	7.1	14.9	7.0		
100 - 999	1				
1,000 +	6.2	5000 +	7.6		
Total summarized	37.5				
Total analyzed	37.5				
0.01 +	37.5	833	8.4		
0.10 +	37.5	833	8.4		
1.00 +	34.5	905	8.6		
10 +	13.3	2339	7.3		
100 +	6.2	5000 +	7.6		
1,000 +	6.2	5000 +	7.6		

Total porosity-feet 314.8

Total millidarcy-feet of 0.1 md. and above 31,228

Mean matrix density 2.67

Remarks:

CHEMICAL & GEOLOGICAL LABORATORIES of MONTANA

113 WEST BELL P. O. BOX 537

GLENDIVE, MONTANA

FULL DIAMETER CORESTUDY

Operator Murphy Corporation Field East Poplar Formation B-1, B-2, C Zone

Well No. Unit # 22 Location SW SW 14-28N-51E Depths 5718-5900

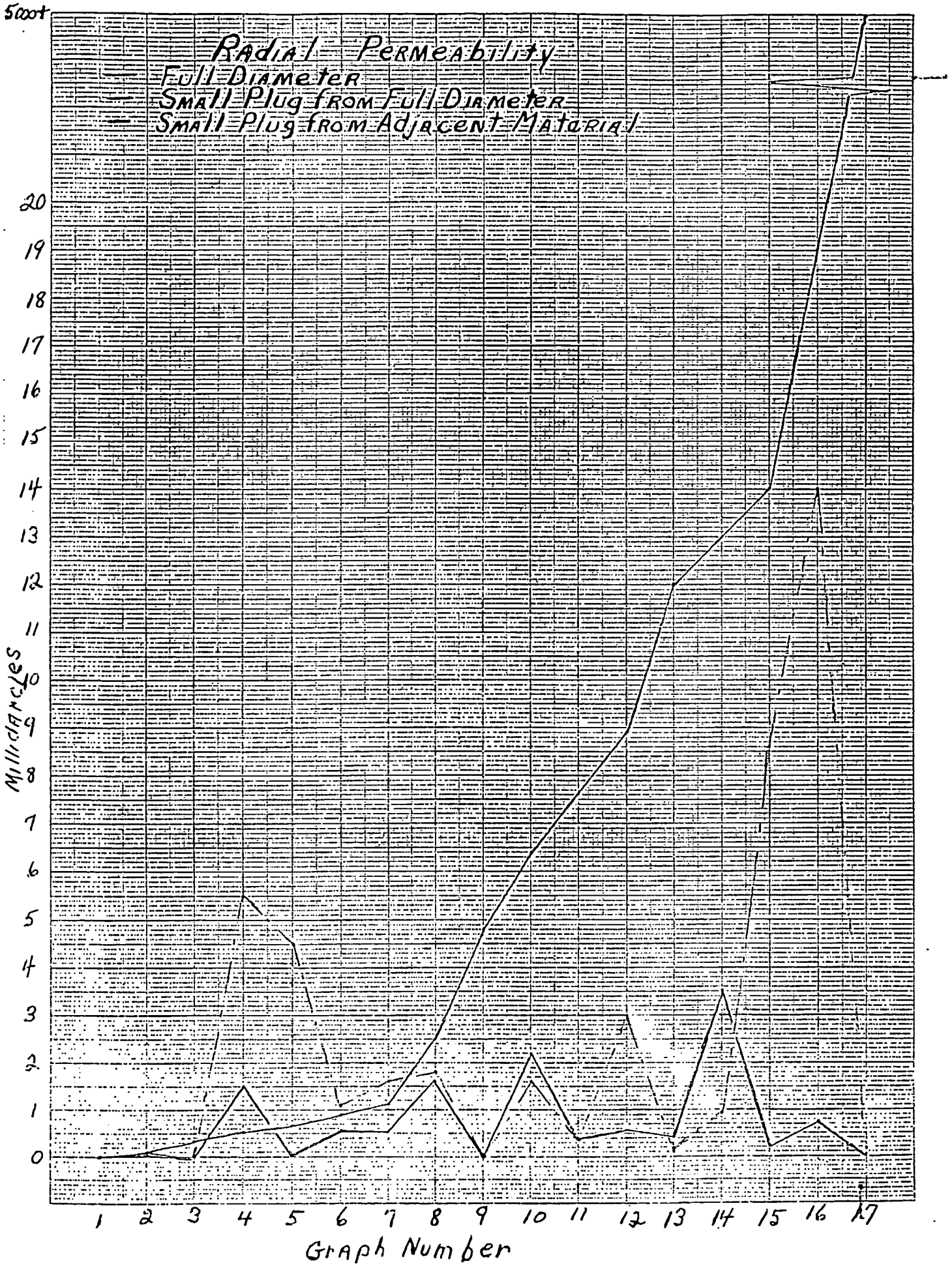
Elevation 2190' K.B., 2177' Gr. Date 4-21-53 Lab. No. 33

SAMPLE NO.	REPRESENTATIVE OF FEET	MIDPOINT OF SAMPLE	FOOTAGE	PERMEABILITY		EFFECTIVE POROSITY %	DENSITY		SATURATION % OF PORE SPACE		DESCRIPTION
				RADIAL	VERTICAL		BULK	MATRIX	RESIDUAL OIL	WATER	
	"B-1" Zone										
1	5718.0-5718.6	5718.3	0.6	12.0	2.9	3.6	2.61	2.71			VC, St
2	5718.6-5721.0	5719.4	2.4	6.4	3.5	18.0	2.24	2.73			I, St
Sim. to 1	5721.0-5722.0		1.0	12.0	2.9	3.6					VC, St
3	5722.0-5724.5	5723.0	2.5	2.5	1.6	11.6	2.44	2.76			I, St
4	5724.5-5726.0	5725.1	1.5	1.1	0.36	12.6	2.39	2.73			I, Any, St
5	5726.0-5726.5	5726.2	0.5	0.90	0.38	7.4	2.52	2.72			I, St
	"B-2" Zone										
6	5736.0-5736.6	5736.4	0.6	0.68	0.45	10.0	2.41	2.68			S Vu, I, St
Sim. to 8	5736.6-5737.1		0.5	14	4.1	10.9					Shy, D, SI
7	5737.1-5740.9	5738.6	3.8	0.50	3.7	14.1	2.29	2.67			I, St
8	5740.9-5741.9	5741.2	1.0	14	4.1	10.9	2.47	2.77			VC, Shy, D, SI
9	5741.9-5742.9	5742.5	1.0	8.9	4.0	11.8	2.41	2.73			I, St
10	5742.9-5744.8	5743.7	1.9	7.6	0.49	6.1	2.49	2.65			VC, I, St
11	5744.8-5747.1	5746.8	2.3	19	15	7.0	2.37	2.55			VC, I, St
Sim. to 10	5747.1-5748.3		1.2	7.6	0.49	6.1					VC, I, St
12	5748.3-5750.0	5749.0	1.7	13.0	0.39	6.9	2.48	2.67			I, St
	"C" Zone										
	5850.0-5882.0		32.0	Not received for analysis							D
Sim. to 17	5882.0-5883.0		1.0	0.02	8.8	2.4					VF, SI, D
13	5883.0-5884.0	5883.5	1.0	0.31	0.01	2.8	2.55	2.63			VC, I, St
Sim. to 16	5884.0-5884.7		0.7	5000 +	5000 +	7.6					VF, I, St
Sim. to 17	5884.7-5885.1		0.4	0.02	8.8	2.4					VF, SI, St
Sim. to 16	5885.1-5887.5		2.4	5000 +	5000 +	7.6					VF, I, St
14	5887.5-5888.4	5887.9	0.9	0.12	0.32	7.0	2.33	2.56			VC, I, St
15	5888.4-5890.1	5889.5	1.7	4.8	0.04	5.2	2.45	2.58			VC, I, St
16	5890.1-5893.2	5890.4	3.1	5000 +	5000 +	7.6	2.38	2.57			VF, I, St
Sim. to 15	5893.2-5894.0		0.8	4.8	0.04	5.2					VC, I, St
N.S.	5894.0-5897.0		3.0								D
17	5897.0-5900.0	5897.6	3.0	0.02	8.8	2.4	2.67	2.73			VC, D

VC - Vertical Crack
St - Stained
Any - Anhydride
Vu - Vuggy
Shy - Shaly
VF - Vertical Fracture

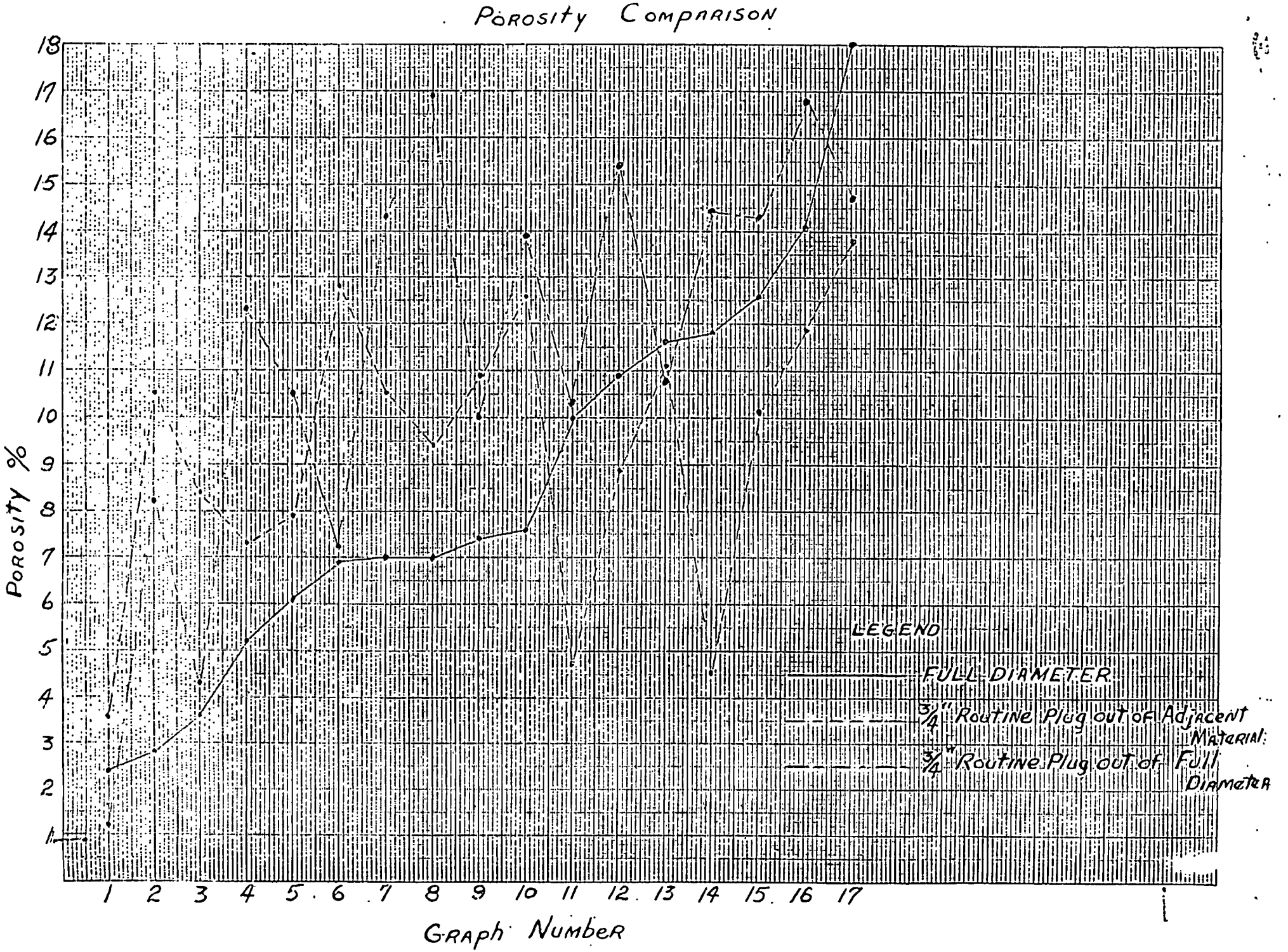
PERMEABILITY DATA COMPARISON

GRAPH NO.	SAMPLE NO.	FULL DIAMETER	SAMPLE FROM FULL DIAMETER	SAMPLE FROM ADJACENT MATERIAL
1	17	0.02	0.0	-0.01
2	14	0.12	0.11	0.09
3	13	0.31	0.01	0.01
4	7	0.50	5.5	1.5
5	6	0.68	4.5	0.03
6	5	0.90	1.1	0.54
7	4	1.1	1.6	0.53
8	3	2.5	1.8	1.6
9	15	4.8	0.04	0.04
10	2	6.4	1.6	2.2
11	10	7.6	0.37	0.37
12	9	8.9	3.0	0.57
13	1	12.0	0.18	0.46
14	12	13.0	0.95	3.5
15	8	14.0	8.6	0.21
16	11	19.0	14.0	0.75
17	16	5000 +	0.13	0.75



POROSITY DATA COMPARISON

GRAPH NO.	SAMPLE NO.	FULL DIAMETER	SAMPLE FROM FULL DIAMETER	SAMPLE FROM ADJACENT MATERIAL
1	17	2.4	1.2	3.6
2	13	2.8	8.2	10.5
3	1	3.6	4.3	8.4
4	15	5.2	12.3	7.3
5	10	6.1	10.5	7.9
6	12	6.9	7.2	12.8
7	11	7.0	14.3	10.5
8	14	7.0	16.9	9.4
9	5	7.4	10.0	10.9
10	16	7.6	13.9	12.6
11	6	10.0	10.3	4.7
12	8	10.9	15.4	8.9
13	3	11.6	10.8	11.1
14	9	11.8	14.4	4.5
15	4	12.6	14.3	10.1
16	7	14.1	16.7	11.9
17	2	18.0	14.7	13.8



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File #2

STAGE NO. _____

DOWELL INCORPORATED

TREATMENT NO. _____

TREATMENT REPORT

DISTRICT #2 STATION Williston, N. D DATE 4-26, 1952

OWNER Murphy Corp LEASE E P G WELL NO. 22
POOL East Poplar COUNTY Roosevelt STATE Montana
LOCATION Sec OWNER'S REPRESENTATIVE Mr James

WELL DATA

FORMATION Charles
PAY-FROM _____ TO _____
PRESENT TOTAL DEPTH _____ P. B. FROM _____

PIPE DATA—
CASING SIZE _____ WT. _____
CASING DEPTH _____ SKS. CEMENT _____
LINER SIZE ✓ WT. ✓
LINER DEPTH-FROM ✓ TO ✓
LINER DESCRIPTION _____
TUBING SIZE 2" EUE DEPTH _____
PACKER-TYPE ✓ DEPTH ✓
PACKER FURNISHED BY OPERATOR _____ DOWELL _____

COMPLETION DATA—
DATE _____ CABLE TOOL _____
ROTARY _____ DRILLING FLUID _____
SIZE OPEN HOLE _____

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO

PRODUCTION—

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD—

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	BBLS. OF ACID OUT OF TANKS	BBLS. OF ACID IN FORMATION	BBLS. OF ACID PER READING	BBLS. OF ACID PER MINUTE	REMARKS
3:30	0	0					ARRIVAL AT LOCATION WITH _____ GALS. OF DOWELL Pump Service
							FILL _____ BBLS.
							BLEED _____ BBLS.
							FLUSH _____ BBLS.
4:55 AM							START displacing WATER out with oil.
9:15							WATER displaced SHUT down To let well flow or be swabbed in

LEFT LOCATION _____

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT.

SERVICE ENGINEER

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STATION OR DISTRICT MANAGER

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103 S-25 15M 10-52

File # 22

STAGE NO. ______

DOWELL INCORPORATED

TREATMENT No. ______

TREATMENT REPORT

DISTRICT #2 STATION Williston N.D. DATE 4-27, 1953

OWNER Murphy Corp LEASE E.P.U. WELL NO. 22
POOL E. Poplar COUNTY Roosevelt STATE Montana
LOCATION ______ OWNER'S REPRESENTATIVE Mr. James

WELL DATA

FORMATION ~~Charles~~ Madison "C" Zone
PAY-FROM ______ TO ______
PRESENT TOTAL DEPTH ______ P. B. FROM ______

PIPE DATA—
CASING SIZE ______ WT. ______
CASING DEPTH ______ SKS. CEMENT ______
LINER SIZE — WT. —
LINER DEPTH-FROM — TO ______
LINER DESCRIPTION —
TUBING SIZE 2" EUE DEPTH 5900
PACKER-TYPE — DEPTH —
PACKER FURNISHED BY OPERATOR ______ DOWELL ______

COMPLETION DATA—
DATE ______ CABLE TOOL ______
ROTARY ______ DRILLING FLUID ______
SIZE OPEN HOLE ______

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO

PRODUCTION—

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD—

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	REMARKS
8:05			ARRIVAL AT LOCATION WITH 1000 GALS. OF DOWELL XFW
9:00			start bleeding Acid To bottom
9:20			Acid spotted on bottom

FILL ______ BBLS.
BLEED 23 BBLS.
FLUSH 29 BBLS.

TIME	CASING	TUBING	BBLS. OF ACID OUT OF TANKS	IN FORMATION	PER READING	PER MINUTE	REMARKS
9:26	240#	2800	23	0	0	0	Start Acid in formation
9:27		2800	24	1	1	1.0	1bbl Acid in formation start 29bbl oil flush
9:33		2200	29	6	5	.9	Breaks from 2800 To 2200#
9:34		2200	34	11	5	5.0	
35		2200	39	16	5	5.0	
36		2200	44	21	5	5.0	
37		2050	49	26	5	5.0	
38		2200	52	29	3	3.0	All Acid displaced + 5bbl over flush
9:43		1300					Shut down pressure

______ LEFT LOCATION ______

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT. ______

B. Owen
SERVICE ENGINEER

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______
STATION OR DISTRICT MANAGER

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File #92

DOWELL INCORPORATED

STAGE NO.

TREATMENT NO.

TREATMENT REPORT

DISTRICT #15 STATION Williston, N.D. DATE 8-11, 1954

OWNER Murphy Corp. LEASE E.P.M. WELL NO. 22
POOL East Poplar COUNTY Roosevelt STATE Montana
LOCATION Sec 14-28-51E OWNER'S REPRESENTATIVE Virgil Greene

WELL DATA

FORMATION Charles "C" Zone
PAY-FROM 5890 TO 5895
PRESENT TOTAL DEPTH 5901 P. B. FROM 5927

PIPE DATA—
CASING SIZE 5½" WT. 15½#
CASING DEPTH 5940 SKS. CEMENT 250
LINER SIZE ✓ WT. ✓
LINER DEPTH-FROM ✓ TO ✓
LINER DESCRIPTION ✓
TUBING SIZE 2" E 4E DEPTH 5874
PACKER-TYPE ✓ DEPTH ✓
PACKER FURNISHED BY OPERATOR ✓ DOWELL ✓

COMPLETION DATA—
DATE ✓ CABLE TOOL ✓
ROTARY ✓ DRILLING FLUID ✓
SIZE OPEN HOLE ✓

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO
5	5890	5895

PRODUCTION—

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD—

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	BBLS. OF ACID OUT OF TANKS	BBLS. OF ACID IN FORMATION	BBLS. OF ACID PER READING	BBLS. OF ACID PER MINUTE	REMARKS
5:00	MST 0	0					ARRIVAL AT LOCATION WITH 500 GALS. OF DOWELL J51 X100
7:45	0	0					START SPOTTING 1265/5 Acid — FILL — BBLS.
7:53	400	300					START 9661 WATER TO SPOT Acid ON FORMATION — BLEED 21 BBLS.
8:05	500	200					Acid Spotted — FLUSH 42 BBLS.
8:12	450	200	27	0	—	—	START Acid IN FORMATION
15	1550	1700	21.2	.25	.25	.25	
16	2000	2100	21.5	.50	.25	25	MAX. PRESSURE
17	1750	2000		.75	.25	.25	PRESSURE BREAK
18	1650	1750	22.0	1	.25	.25	PRESSURE STILL DECREASING
20	1750	1650					PRESSURE INCREASE
22	1550	1700	23	2	1.0	.25	PRESSURE BREAK
23	1450	1600					
24	1350	1500					
8:25	1150	1250	24	3	1.0	.3	
27	1050	1200	24.5	3.5	.5	.25	
29	1000	1150	25	4.0	.5	.25	
8:30	950	1100	25.5	4.5	.6	.5	4.5-66/6 Acid IN - 900# BREAK. SHUT DOWN
8:33	650	800					BLEED DOWN PRESSURE
							LEFT LOCATION

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT.

R. Owen
SERVICE ENGINEER

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Tubing 22

DOWELL INCORPORATED

STAGE NO.

TREATMENT NO.

TREATMENT REPORT

DISTRICT #15 STATION WILLISTON, N. DAK DATE 8-13, 1954

OWNER Murphy Corp LEASE E.P.A. WELL NO. 22

POOL East Poplar COUNTY Roosevelt STATE Montana

LOCATION Sec. 14-28-51E OWNER'S REPRESENTATIVE Virgil Greene

WELL DATA

FORMATION Charles "C" Zone

PAY-FROM 5890 TO 5895

PRESENT TOTAL DEPTH 5901 P. B. FROM 5930

PIPE DATA—

CASING SIZE 5½" WT. 15.5#

CASING DEPTH 5940 SKS. CEMENT 200

LINER SIZE ← WT. ←

LINER DEPTH-FROM ← TO ←

LINER DESCRIPTION ←

TUBING SIZE 2" EUE 8rd DEPTH 5896

PACKER-TYPE DEPTH

PACKER FURNISHED BY OPERATOR DOWELL

COMPLETION DATA—

DATE CABLE TOOL

ROTARY DRILLING FLUID

SIZE OPEN HOLE

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO
5	5890	5895

PRODUCTION—

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD—

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	BBLS. OF ACID OUT OF TANKS	BBLS. OF ACID IN FORMATION	BBLS. OF ACID PER READING	BBLS. OF ACID PER MINUTE	REMARKS
							500 JE/3500
12:00 MST							ARRIVAL AT LOCATION WITH 1500 GALS. OF DOWELL JE/X100
1:17PM	500	500					START 1266/s JE/X500 down Tubing — FILL — BBLS.
1:24							START 966/s Acid To SPOT JE/ON FORMATION — BLEED 21 BBLS.
1:30	1000	700					JE/ SPOTTED — FLUSH 21 BBLS.
1:38	850	650	21	0	21	1.6	START JE/ IN FORMATION
40	1700	2000	24	3	3	1.5	INCREASE PUMP RATE
41	2200	2400	29	8	5	5.0	
43	2100	2600	40	19	11	5.5	PRESSURE dropping
44	2050	2850	45	24	5	5.0	
45	1950	2800	48	27	3	3.0	All Acid + JE/ pumped
46	1800	2900					START 2166/s oil flush
47	1600	2750	53	32	5.0	5.0	
48	1500	2750	58	37	5.0	5.0	PRESSURE DECREASING
1:49	1400	2700	63	42	5.0	5.0	
50	1400	2700	68	47	5.0	5.0	
1:51	1350	2700	69	48	1	1.0	All JE/ & Acid displaced. SHUT DOWN
1:53	750	900					BLEED DOWN PRESSURE
							LEFT LOCATION

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT.

B. Owen
SERVICE ENGINEER

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Jel #22

STAGE NO.

DOWELL INCORPORATED

TREATMENT NO.

TREATMENT REPORT

DISTRICT #15 STATION Williston, N. Dak DATE 8-21, 1954

OWNER Murphy Corp LEASE E.P.U. WELL NO. 22
POOL East Poplar COUNTY Roosevelt STATE Montana
LOCATION Sec 14-28-51 OWNER'S REPRESENTATIVE Virgil Greene

WELL DATA

FORMATION "C" Zone
PAY-FROM 5890 TO 5895
PRESENT TOTAL DEPTH 5901 P. B. FROM 5927

PIPE DATA–
CASING SIZE 5½" WT. 15½#
CASING DEPTH 5930 SKS. CEMENT 200
LINER SIZE WT.
LINER DEPTH-FROM TO
LINER DESCRIPTION
TUBING SIZE 2" EUE DEPTH 5890
PACKER-TYPE ″ DEPTH ″
PACKER FURNISHED BY OPERATOR DOWELL

COMPLETION DATA–
DATE CABLE TOOL
ROTARY DRILLING FLUID
SIZE OPEN HOLE

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO
5	5890	5895

PRODUCTION–

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD–

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	BBLS. OF ACID OUT OF TANKS	BBLS. OF ACID IN FORMATION	BBLS. OF ACID PER READING	BBLS. OF ACID PER MINUTE	REMARKS
12:01	MSTP	8					ARRIVAL AT LOCATION WITH 1000 GALS. OF DOWELL Jel X100
5:55PM							START OIL TO FILL HOLE — FILL 100 BBLS.
6:26							RAN OUT OF OIL. — BLEED 22 BBLS.
6:27							START 2266 Gal Acid — FLUSH 27 BBLS.
6:59	1000	800					Acid Spotted
6:42	1000	800	22	0	22	1.9	START Acid in formation
43	1800	1780	23	1	1	1.0	
44	1800	1750	24	2	1	1.0	
46							START 2766 Gal oil flush
47	1650	1800	28	6	4	2.0	
49	1550	1800	31	9	3	1.5	
51	1450	1800	34	12	3	1.5	
54	1350	1800	40	18	6	2.0	INCREASE PUMP RATE
57	1250	1800	46	24	6	2.0	
6:59	1250	1800	49	27	3	1.5	All flush Complete SHUTDOWN
7:04	650	1100					Bleed down pressure

LEFT LOCATION

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT.

B. Owen
SERVICE ENGINEER

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STATION OR DISTRICT MANAGER

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STAGE NO.

DOWELL INCORPORATED

TREATMENT NO.

TREATMENT REPORT

DISTRICT 15 STATION WILLISTON DATE 8-26, 19 54

OWNER MURPHY CORP. LEASE E.P.U. WELL NO. 22

POOL E. POPLAR COUNTY ROOSEVELT STATE MONTANA

LOCATION 14-28N-61E OWNER'S REPRESENTATIVE

WELL DATA

FORMATION C

PAY-FROM 5882 1/2 TO 5887 1/2

PRESENT TOTAL DEPTH 5886 P. B. FROM —

PIPE DATA—

CASING SIZE 5 1/2 O.D. WT. 15.5 #

CASING DEPTH — SKS. CEMENT —

LINER SIZE — WT. —

LINER DEPTH-FROM — TO —

LINER DESCRIPTION —

TUBING SIZE 2 EUE DEPTH 5886

PACKER-TYPE NO DEPTH —

PACKER FURNISHED BY OPERATOR — DOWELL —

COMPLETION DATA—

DATE OLD CABLE TOOL —

ROTARY ✓ DRILLING FLUID MUD

SIZE OPEN HOLE —

PERFORATING DATA OR PAY ZONES

SHOTS/FT.	FROM	TO
4	5882 1/2	5887 1/2

PRODUCTION—

	OIL	WATER	G. O. R.
INITIAL			
PRESENT			

ACIDIZING, SHOOTING AND LOGGING RECORD—

DETAILED RECORD OF TREATMENT

TIME A.M. OR P.M.	PRESSURE CASING	PRESSURE TUBING	BBLS. OF ACID OUT OF TANKS	BBLS. OF ACID IN FORMATION	BBLS. OF ACID PER READING	BBLS. OF ACID PER MINUTE	REMARKS
4:00	0	0					ARRIVAL AT LOCATION WITH 500 GALS. OF DOWELL VEL-X 100
4:50	400	0					START CIRCULATING WITH OIL — FILL 22.3 BBLS.
7:15	0	0					HOLE LOADED WITH OIL — BLEED — BBLS.
7:40	300	200					START BLEEDING ACID TO BOTTOM — FLUSH 13 BBLS.
7:43	200	0	12	0	—	—	START DISPLACING ACID
7:45	1300	1000	—	1	1	.5	PRESS. READING
7:49	2500	2200	—	3	2	.5	BREAK 2200 TO 2400
7:54	2100	2100	—	12	9	1.2	FLUSH COMPLETE
8:05	1700	1700	—	—	—	—	STANDING PRESS.

LEFT LOCATION

IF TREATMENT IS NOT CONVENTIONAL LIMESTONE FORMATION TREATMENT TO INCREASE OIL OR GAS PRODUCTION, STATE PURPOSE OF TREATMENT.

R. L. METTLE
SERVICE ENGINEER

DISTRICT OFFICE COPY.

STATION OR DISTRICT MANAGER

U. S. A.

DOWELL INCORPORATED

TREATMENT NO.

TREATMENT REPORT Acidizing SERVICE

DISTRICT #15 STATION Glendive 02 DATE 1-13, 1952

OWNER Murphy Corp. LEASE Ford WELL NO. 22

POOL East Poplar COUNTY Roosevelt STATE Montana

LOCATION Sec 22-29N-51E OWNER'S REPRESENTATIVE Dowden + James

FORMATION "C" Zone CASING SIZE 5½" WEIGHT 15½#

PAY FROM 5882.5 TO 5887.5 CASING DEPTH 5950 SACKS CEMENT 250

PRESENT TOTAL DEPTH 5888 P. B. FROM 5851 LINER: FROM TO SIZE WT.

DATE WELL COMPLETED SIZE O. H. TUBING SIZE 2"EUE DEPTH PERF

PERFORATING DATA OR PAY ZONES: PACKER: TYPE Halliburton DEPTH

SHOTS/FOOT	FROM	TO
4	5882.5	5887.5

TUBING: VOLUME 22 ALLOWABLE PRESSURE 4500#

CASING: VOLUME — ALLOWABLE PRESSURE 2700#

PRODUCTION: INITIAL PRESENT

ACID, SHOOTING & FRACTURING RECORD

TREATING MATERIALS:

TYPE	AMOUNT
Je1X100	2000 gallons

TREATING EQUIPMENT:

PUMPING EQUIPMENT 1 TO Pumper

MIXING OR BLENDING

FLUSH TANKS

OTHER

TIME A.M. or P.M.	PRESSURE CASING	PRESSURE TUBING	BARRELS OF FLUID OUT OF TANKS	BARRELS OF FLUID IN FORMATION	BARRELS OF FLUID PER READING	BARRELS OF FLUID PER MINUTE	REMARKS
12:00							ARRIVED AT LOCATION
12:50	0	0					Break formation down 3500# Limit
12:52	0	1400	5	5	5	2.5	Feeding Pressure 1400#
12:55	2700	500					Pressure Casing to 2700#
1:10	2500						Start 22 bbls Acid down Tbg.
1:17		500	28	28	23	3.2	Acid on formation. Catch flush
1:32	2300	300					Start Acid in formation
1:33	1800	400	34	34	6	6.0	
1:34	1700	400	40	40	6	6.0	
1:35	1100	400	46	46	6	6.0	
1:36	1100	350	52	52	6	6.0	
1:37	1100	400	53	53	1	1.0	All Acid Pumped Start 22 bbls oil flush
1:38	1100		58.7	58.7	5.75	5.75	
1:39	1000		64.5	64.5	5.75	5.75	
1:40	900		70.2	70.2	5.75	5.75	
1:41	800		77	77	5.75	5.75	All Acid displaced Shut down
1:45	800	300					Shut down pressure

TOTAL BBLS. PUMPED: FILL & BREAKDOWN 5 TREATING FLUID 48 FLUSH 22

AVERAGE RATE: TREATING FLUID 6.0 FLUSH 5.75

TREATING PRESSURE: MAXIMUM 500 MINIMUM 300

SERVICE ENGINEER R Owen STATION MANAGER

STATION COPY.

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PENKOTA WIRELINE SER[illegible]ES, INC.
REMIT PAYMENT TO:
P.O. BOX 1852
WILLISTON, ND 58802-1852

Invoice

DATE	INVOICE #
09/16/1999	3336

BILL TO:	SHIP TO:
Murphy Oil USA Corporation PO Box 547 Poplar, MT 59255 Customer: #4070	Murphy Oil USA Corporation PO Box 547 Poplar, MT 59255 Customer: #4070

P.O. NUMBER	TERMS	REP	SHIP	VIA	F.O.B.	PROJECT
4144	Net 30	BB	09/16/1999	TR #26	ROOSEVELT MT	

QUANTITY	ITEM CODE	DESCRIPTION	PRICE EACH	AMOUNT
		[illegible]		
	1000-110	SERVICE CHARGE [illegible]		
	1000-181	PRESSURE CONTRO[illegible]		
	1400-005	FREEPOINT 2 3/8" TUBING TO [illegible]		
	1500-005	1 13/16" JET TUBING CUTTER [illegible]		
	1000-110	SERVICE CHARGE 9-16-99		
	2300-[illegible]	SE[illegible]		
	2300-050	DUMP BAIL 4 SACKS CEMENT ON [illegible]		
		CIBP AT 3835		
		TOTAL DISCOUNTED PRICE	1075.00	1075.00

TOTAL $4,675.00

THIS INVOICE DUE AND PAYABLE IN WILLISTON, WILLIAMS COUNTY, NORTH DAKOTA WITHIN 30 DAYS OF INVOICE DATE.

PRODUCTION &
INJECTION DATA